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Universal Wood Working Machine.

Our engravings illustrate an improved wood working machine which we are informed is now in successful operation in over one hundred and twenty of the best shops in the country, representing almost, if not quite, every variety of wood working, sashes, doors, and blinds, furniture and bedsteads; in railroad car shops, wagon and carriage shops, manufactories of distillers' and brewers' tubs, machine shops, brush factories, etc., etc. Its uses are rabbeting, plowing, gaining, beveling, jointing, hand-matching, planing out of wind, etc. It has capacity for heavy or light work, gaining from $\frac{3}{16}$ in. wide to 4 in. wide, and 3½ in. deep at one cut in hard wood, also half round or bevel gains for boxing, and is specially adapted for planing turned work, such as bedstead posts, stand and table legs, and routing for the post and rail irons, making glue joints, rolling joints for table leaves, also shallow mortices for joint bolts, planing out of wind, smoothing, jointing, and rabbeting blinds at *one operation*. It is not complicated, and is quickly adjusted, requiring no more time than to remove one head and put on another. It may be converted into a saw table by the same operation, and then adjusted by turning the hand wheels.

In Fig. 2, showing sticker side or molder attachment with side-head, the fence, which is used for squaring, beveling, jointing, rabbeting, etc., is removed, giving a view of the tops of the three beds, which are made of *iron* and planed straight, the front ones having a recess for slide boards, used in sawing, gaining, etc. The feed rollers never rise out of gear and are always straight with the bed (or parallel), thus holding the work firmly on both sides while being passed through. It will stick sash or an eight-inch crown molding, and has a fifteen-inch drop. Two persons can work on it at the same time advantageously.

Three kinds are made, one with boring and routing attachment, one with sticker or molder attachment for planing one side (without side-head), and one for planing two sides. The principal parts are lettered for reference in Fig. 1, and the following description will give the reader a general idea of the construction and capacity of the machine:

A is the main frame. B is an adjustable table extending the full length of the machine. C and C are also adjustable tables, independent of each other and of table B, sliding upon beds, D, which rest upon the inclines, E. These inclines are bolted to a sliding frame, and all the tables are raised and lowered by forcing the inclines backward and forward by means of the screws, F.

G is an iron fence, graduated in half and quarter inches, fastened to and forming an exact right angle with the table, B, and held by wing nuts through slots in the arms, and which can be moved over the tops of the knives.

For dressing straight work the bed, C, in rear of the bits, is adjusted to the exact hight of the circle described by the bits in revolving. The bed, C, in front of the bits must be adjusted as much lower than the rear bed as the thickness of the cut required. Thus as soon as the work has passed to the rear bed it has a solid bearing on both sides of the bit, and will be dressed entirely straight and out of wind. In squaring the fence is used so as to have an exact right angle. For rabbeting, gaining, or fluting both beds are lowered to the desired depth below the knives. For tapering one end of the work is rested on the rear bed before cutting, and the front bed is depressed to the depth of the taper required. The work is then passed over as usual. When access to the bits is desired, either for the purpose of sharpening them or changing the head, a wing nut underneath the table, C, (not shown) is loosened, which permits the tables, C, to slide backward and forward, and to be adjusted for a saw or head of any size required. There is also an arrangement shown attached to beds D and A, and to cross-ties below, whereby the tables are made to move, in lowering and raising, in an oblique direction, and are carried toward the bits in raising, and away from them when lowering, thereby preventing the bits from striking the beds, when adjusted, while running. The bevel nut and fence are made in a single piece, and can be adjusted at any angle. A sticker attachment is also made, with feed rollers, etc., for planing one and two sides in place of the boring and routing attachment. It will plane eight inches wide and has a fourteen-inch drop.

We have seen specimens of the work done on this machine, which for variety and quality is very remarkable. One of the pieces sent us has, after being first planed, had rabbeting, gaining, plowing, beveling, routing, and cornering done upon it in a most superior manner, and all the work gives evidence that this machine is one of the most useful of its class.

For further information address the manufacturers, McBeth, Shaffer & Co., Hamilton, Ohio.

Fig. 1

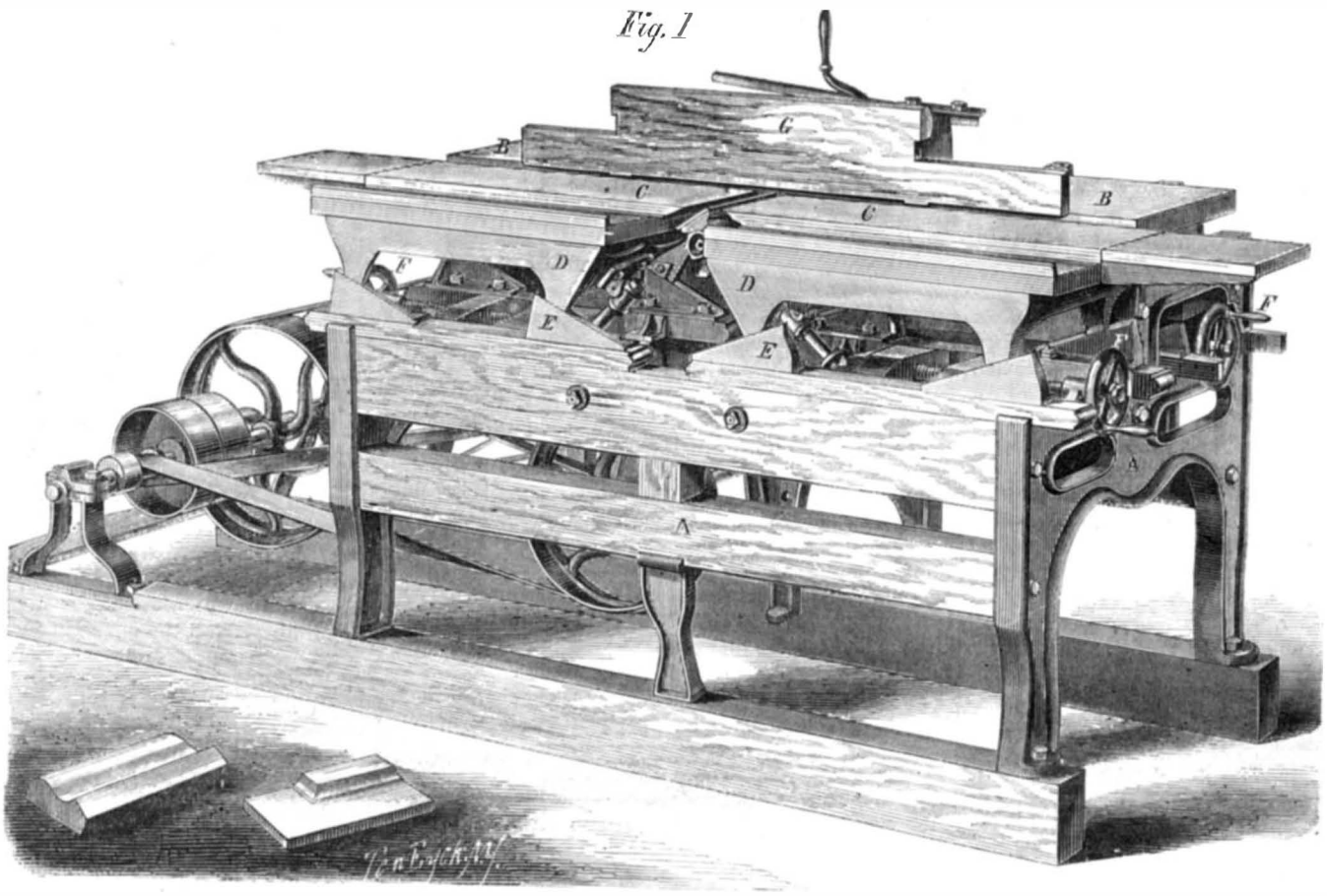
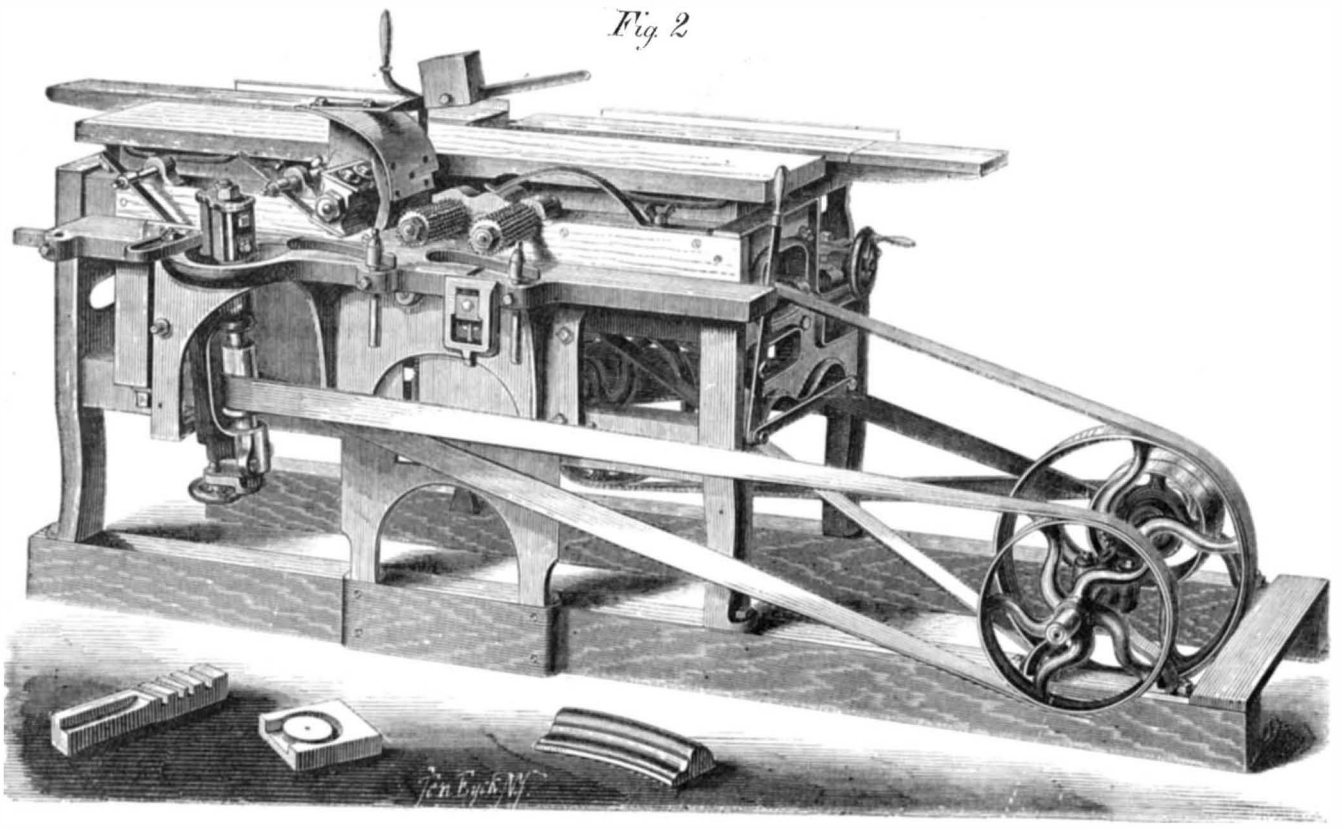


Fig. 2



McBETH, SHAFFER & CO.'S UNIVERSAL WOOD WORKER.

Glucose.

In Europe glucose is manufactured from wheat, potatoes, and starch, and though the first named, as important staples of food, are not generally supposed by those unacquainted with the science of chemistry to contain any such sweetening properties as sugar, repeated experiments have demonstrated the fact that they in reality do, and, with confectioners who require the addition of an almost colorless preparation for the more delicate kinds of their manufacture, and with brewers who are interested in making the paler sorts of ale clear and sparkling, it is gradually taking the place of sugar, the well-known embodiment of sweetness in its more perfect form. The characteristics of glucose are almost the opposite of those of its celebrated rival, as, at the same time, that it can be made into a solid, consisting of minutes granules, more or less soft and hard, similar to those of raw sugar; it can also be worked into a thick whitish liquid, semi-transparent, and is, as the first syllable of its name implies, rather *gluey*, to which may be added gluten, a substance highly esteemed for its powers of strengthening and nourishing the animal system. Owing to its comparative weakness, however, glucose will never successfully compete with sugar as expressed from the cane juice alone, but, for the peculiar purposes to which it may be applied (as, for instance, those above referred to), it will no doubt become more freely used, its decided cheapness being no small recommendation to those who have not yet ventured upon giving it a fair trial. A cheap method of transforming glucose into cane sugar is a chemical desideratum.

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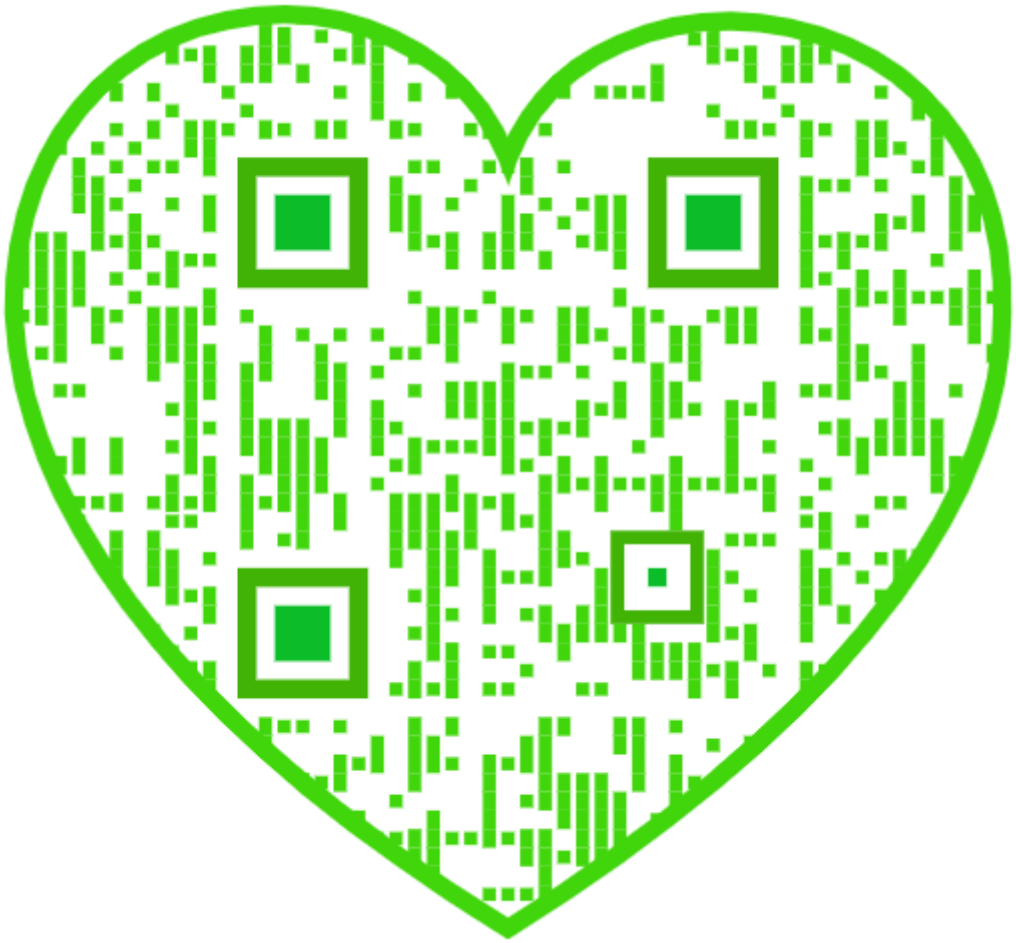

THE GRINDING AND POLISHING OF PLATE GLASS BY MACHINERY.

[From the Handbook for the Artisan.]

This is perhaps the largest example of the production of plane surfaces by grinding.

The plates of glass, as they come from the annealing oven, measure about half an inch thick, and the surface is full of small irregularities, presenting a mottled appearance, the roughest side being generally that which was placed downwards upon the bed of the annealing oven, and copied all the irregularities of the bricks of which the bed of the oven is formed. The side of the glass that was uppermost in the oven is comparatively smooth and bright from the action of the fire, although in many cases this surface is not so nearly flat as the lower. The plates have therefore to be ground flat, and polished on both sides; formerly this was effected entirely by hand, but of late years the rough grinding with coarse sand, and the polishing with crocus, are almost always done by machinery, and hand labor is only resorted to for the intermediate process of smoothing with fine emery.

The grinding and polishing machines employed for plate glass differ somewhat in construction in various manufactories; but a single example of each will sufficiently explain the general method.

The grinding machines employed for the largest plate glass are arranged in pairs along the grinding room; every pair of machines is driven by one central beam, and consists of two benches of stone fifteen feet long, eight feet wide, and eighteen inches high, placed about ten feet asunder; upon each of these benches one or more plates of glass are embedded in plaster of Paris, close together, and quite level. Other plates of glass are cemented upon the lower faces of two swing-tables, or runners, which are traversed over the fixed beds by a horizontal frame or beam about thirty feet long; the machinery for driving the beam is fixed in a frame about six feet square and eighteen inches high, placed between the two grinding benches. A horizontal shaft, fixed underground, extends throughout the length of the grinding room between the lines of benches, and the motion from the shaft is communicated to every pair of machines, by a pair of bevel wheels, leading to a central crank that revolves horizontally, and has a radius of about two feet; the arm of the crank is attached by a pivot to the center of the horizontal beam. Four other cranks of the same radius are placed parallel to the central driving crank, one at each corner of the square frame, and serve to guide the traverse of the horizontal beam, which is thus swung in a circle of four feet diameter in a manner somewhat similar to the grinding bed for marble. The beam is supported at various parts of its length by chains suspended from the roof of the building, which allow of the traverse of the beam, and serve for raising it by means of levers for the removal of the work.

Near each end of the beam is attached, with the power of adjustment for position, a small sliding frame, carrying bearings for the reception of the central pivot of the swing table or runner, which consists of a strong frame of wood covered with boards, and measuring eight feet long and six feet wide, placed face downward upon the bench; a central pivot stands up from the back of the runner, and enters the bearing fixed on the horizontal beam, which thus communicates a circular swinging motion to the center of the runner, exactly the same as that of the driving crank; and the runner, being free to revolve upon its pivot, acquires a continual rotation around its own axis. By the combination of the two movements the relative positions of the fixed bench and runner are continually changing; this tends to the mutual correction of the two surfaces of the glass, and greatly assists the equal distribution of the sand and water used in grinding. The horizontal beam makes about fifty circulating strokes in a minute, and the runners revolve upon their own axes about once to every five or six strokes. The position of the runners upon the driving beam is shifted once or twice during the grinding, to distribute the action as uniformly as possible over the entire surfaces of the glass plates.

The largest plates of glass are nearly equal in size to the fixed bench, and these are embedded singly upon the bench with the most irregular side upwards; but more generally plates of medium and small size are ground together; they are selected of uniform thickness, and arranged close together upon the bench, with the largest plates in the middle and the smallest at the ends. The runner is covered by one or two plates at most, as small pieces would be liable to be thrown off by the centrifugal force.

All the irregularities of the surfaces are first ground out with sharp river sand that has been washed and sifted into two sizes; the sand and water are thrown on by hand occasionally, and when the plates have been ground quite flat, the finer sand is employed, and followed by emery of two finer sizes, applied as usual in succession, in order to remove the scratches made by the coarser powders. The plates of glass are thoroughly washed between every change of grinding powder, and when the one side of the glass has been ground with the finer sizes in succession, the plates are inverted, and the same routine is followed on the second side.

The grinding machines do not, however, admit of being employed with very fine emery, as the close approximation of large surfaces, traveling over each other at a considerable velocity, causes so much friction that it would be liable to tear the surface of the glass, and, consequently, as the plates become sufficiently smooth to require the application of fine emeries, the velocity and pressure should be proportionally reduced, and a greater degree of care and management is required.

The plates are smoothed upon stone benches of suitable size, about two feet high, made very flat upon their surfaces, and covered with wet canvas. One large plate, nearly equal to the size of the bench, and two or three plates of about half the size, are usually given out as a set of work. The large plate is laid upon the wet canvas, which serves to hold it firmly, emery and water are spread over the surface; and one of the small plates is used as a grinder or runner. If the plates be large, a few flat lead weights of about fourteen pounds each are laid near the middle of the runner, to distribute the pressure uniformly, and the runner is traversed over the lower plate with a swinging stroke backwards and forwards, so as to describe nearly a semicircle around the center of the runner, which is at the same time shifted a few inches during the stroke. Every stroke follows a slightly different path from the preceding one, and the runner is also gradually twisted round as the smoothing proceeds. The combination of these movements serves to expose every part of the surfaces of the bed plate and runner to an equal amount of grinding, and also to distribute the emery very uniformly.

Small plates are smoothed by young girls; and large plates, which require greater dexterity and a proportionate increase in the amount of traverse, are smoothed by two women, who stand on opposite sides of the bench, and, placing their outstretched hands flat upon the runner, swing it with a stroke of five or six feet. The employment appears most masculine, but it is found that the smoothing is, upon the whole, executed better by women than men, as only a moderate force is required, and, from the greater delicacy of touch possessed by females, they more readily appreciate when any particles of grit have become accidentally mixed with the emery.

About six sizes of carefully washed emery are used in the smoothing, and between every size the plates, canvas, bench, and hands are thoroughly washed; perfect cleanliness in the clothing is also quite essential, as a particle of coarse grit would make a scratch that would require the smoothing of the plates to be recommenced. The fine emery last employed gives a very smooth and partly polished surface, which is completed with the machine next described.

The polishing machine has a bed fifteen feet long and eight feet wide, that is mounted upon rollers, and slowly traversed sideways, a space of four feet, to and fro, by means of a rack and pinion beneath. A few inches above the bed are reciprocated, longitudinally, two beams or carriages, each about eighteen feet long and nine inches wide, and consisting of two cast-iron side plates connected together at intervals, and supported at each end upon two small wheels, that run upon a short railway at the end of the traversing table. The carriages are placed four feet asunder, and reciprocated about two feet, by means of two cranks fixed opposite to each other on the same axis, so that the beams work in opposite directions—the one advancing as the other recedes.

The plates of glass are embedded close together, with their surfaces quite level, upon movable platforms that are afterwards fixed upon the traversing bed, and the polishing is effected with a series of rubbers, placed one foot asunder and measuring eight by six inches, covered with thick felt, and attached to the reciprocating carriages, which drag the rubbers backwards and forwards over the surface of the glass, while the latter is traversed beneath the rubbers a space equal to the distance between the two lines of rubbers, to expose all parts of the glass equally to their action.

Every rubber is separately attached to one of the two carriages, to allow it to ply uniformly to the surface of the glass. This is effected as follows: Between the two side plates of the beam are fixed, near the top and bottom edges, two cross-pieces having square holes, through which slides vertically a square bar, the lower end of which projects about two inches below the beam, and is rounded semi-cylindrically. The rubber is made quite detached, with a central cavity at the back to fit the end of the upright bar, which thus forms a joint that allows the rubber to adjust itself to any trifling irregularities of the surface over which it is traversed, and the rubbers admit of being readily removed while the plates of glass are being exchanged. The pressure is given separately upon every rubber by two lead weights of about fifteen pounds each, fixed one on each side of the upright bar.

The powder generally employed for polishing plate glass by machinery is the Venetian pink of the colorman, a cheap powder, which contains only a small proportion of the oxide of iron, mixed with earthy matter that renders the powder less active, and allows of the free use of water, which serves to reduce the friction and prevent the glass becoming heated by the action of the rubbers. Tripoli, crocus, and putty powder used with water, are too active to produce a high polish on glass, and therefore they are generally employed dry for the last finish of glass polished by hand. But the great amount of rubbing surface, the velocity, and power employed for polishing plate glass by machinery, render the use of dry powders inadmissible, as the surface would be torn by the friction, and the heat evolved would be liable to break the glass.

Sometimes old plate glass, that has become scratched, is repolished; when the plates are large, and sufficiently numerous, they are repolished by machinery, just the same as new glass, but more generally old plates are repolished by hand, as the process can be then restricted principally to the scratched portions of the surface.

The polishing is commenced with tripoli on cloth rubbers of the usual form, and finished with putty powder or crocus. The pressure is generally given as in hand calendering, by attaching the rubber to the lower end of an upright pole, suspended from a long horizontal spring fixed overhead, like that of a pole lathe. The elasticity of the spring supplies the pressure, and the workman has only to push the rubber backwards and forwards, but the process is both laborious and tedious with large plates, and from the irregular action of the hand, the surfaces of glass thus polished present a wavy appearance much inferior to those polished by machinery.

Suspension Bridges.

There is a close resemblance in the relation of cast-iron bridges to railway traffic to that occupied by those of the hanging or suspension type. The similarity is not, however, fully borne out, for in this country there are numerous bridges of cast iron, which have served the purposes of conveying locomotive traffic for many years, whereas there is not a single instance in which a suspension bridge has done duty in that capacity. The difference, therefore, is, that the use of cast iron for railway bridges is restricted within narrow limits; that of the suspension principle prohibited altogether. Where the analogy exists most forcibly is in the reason or cause of this restriction and prohibition. It will be found to be identical in both instances and to have emanated from the circumstance of actual failure having attended both of these descriptions of structures in the early days of steam locomotion. Many may be inclined to argue that, bearing in mind the very imperfect manner in which the theory and practice of iron bridge construction were understood at that time, this circumstance is really of little value, and that the bridges may be more sinned against than sinning. It is possible that there may be some amount of truth in this argument, so far as regards the employment of cast iron, but it does not extend to suspension bridges. The complete unsuitability of that principle to the purposes of a heavy isochronously moving load was demonstrated too palpably to allow of any hesitation respecting its rejection in future for that purpose. In the early part of his professional career Sir William Fairbairn was called upon to devise means for strengthening one of these suspension structures that had been erected on a line of railway. For this object a staging was erected, and piles driven into the ground, when the undulations into which the platform of the bridge was thrown by the passage of a train, caused so tremendous a vibration that it actually drew the piles out of the ground. The point worthy of notice in this failure presents an aspect different to that to which we shall presently draw attention when touching upon cast-iron bridges. It indicates, unmistakably the radical unsoundness of the principle when employed for the conveyance of loads that have a tendency not only to create, but, in conjunction with the system of structure adopted, to accumulate vibration and oscillation. This unfortunate predisposition to accumulate vibration *a crescendo* from a moving load is the bane of the suspension principle. If the cause, such as the measured tramp of a number of people, the march of troops, or the passage of cattle, be continued long enough, the bridge would infallibly yield to the disturbing action, and the chains give way. A suspension bridge may be said to contain in itself, by virtue of the principles which govern its construction, more than other descriptions of bridges, the elements of self-destruction.

Reference is usually made when this subject is touched upon to the Niagara Suspension Bridge as a proof that this principle has been successfully applied to railway traffic. This argument is specious and shallow to the last degree. It is true that railway cars do creep across the Niagara bridge at about six miles an hour, but this does not constitute that bridge a railway bridge in the proper sense of the term. When a suspension bridge is erected over which a mail express can rush at a speed of fifty miles per hour, the problem will be solved, the present insurmountable difficulty overcome, and we shall have in reality a "rigid suspension bridge." In the eyes of English engineers it is a mere farce to put forward the Niagara Bridge as a successful example of the application of the suspension principle to the conveyance of locomotive traffic.

Besides the structure is such a mass of stays, struts, and braces above and below that it is scarcely possible to consider it in the light of a genuine suspension bridge. In all probability the design was originally based on that principle, but the exigencies of actual practice required it to be so materially modified that it retains very few of its normal characteristics. There is no difficulty in designing a bridge on the suspension principle, and subsequently introducing such elements of trussing and bracing that may ultimately convert the whole structure into a girder bridge. This is really what occurs when a suspension bridge is stiffened to such a degree that it cannot possibly vibrate, oscillate, or deflect. But when this is accomplished, not only is all the value of the principle nullified, but the amount of material required is a great deal more than what would suffice to build a bridge on another plan altogether.—*London Mechanics' Magazine.*

A Cooling Drink in Hot Weather.—A delicious and slightly aperient effervescing citrate of magnesia may be made by thoroughly mixing 3 ounces of powdered loaf sugar with 2 ounces of powdered citric acid, then add ¾ ounce of calcined magnesia, 1½ ounce of bicarbonate of soda, and 1½ ounce of tartaric acid. Pass the whole thrice through a fine sieve, and then moisten it with very strong alcohol. Granulate it by passing it through a coarse sieve, and dry on a wooden tray at a temperature of 50° C. When dry add ten drops of essential oil of lemons, and then bottle at once in clean dry bottles.

Every year the sugar manufactory of Halfweg, situate between Amsterdam and Haarlem, sends into the province a seed-sowing machine for use in the fields devoted to the culture of the beet. Advances are even made to the proprietors of the ground, on condition that they sell their products at the manufactory above mentioned at a merchantable price. In this way the population is initiated in the employment of agricultural machines, at the same time being engaged in a work advantageous to the country.

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Summer Rules.

Dr. Hall, in his *Journal of Health*, says: If you have walking or riding to do, ride first, because if you walk you may get over heated, and then, when you ride, you may be exposed to an open window or a draft of air while you are in a still position, to be followed by a chill, a pleurisy, or lung fever, which is pneumonia.

If on any occasion you find yourself the least bit noticeably cool, or notice the very slightest disposition to a chill running along the back, as you value health and life, begin a brisk walk instantaneously, and keep at it until perspiration begins to return; this will seldom fail to ward off a summer cold, which is more dangerous than a cold taken in winter to all persons having the slightest tendency to consumption.

DRINKING WATER.—If very thirsty and warm, take but a swallow at a time, taking the glass from your lips, with a dozen seconds between the swallows, then you will never fall dead while taking a drink, as many have; in this way half the amount of water will abundantly satisfy the thirst.

Soda water is an agreeable beverage, but half a glass of cold water will better and more safely satisfy the thirst and costs nothing. Besides, in taking a glass of water, you stop when you feel you have had enough; this you never do with a glass of soda, but keep on drinking after it is positively disagreeable; and you hate to stop, but drink on again, to prevent wasting it.

Never sleep in the day-time uncovered, in summer; it is always dangerous, even if it be but half an hour on a bed; a lace shawl is better for a covering than nothing. Many lie down for a few moments, especially ladies coming from a walk, visit, or shopping; they do not intend to go to sleep, just to rest a minute or two; but many times they go to sleep and wake up with an indistinct chilly feeling, followed in many cases by serious illness.

When you reach home tired and weak, and may be accompanied with an indefinable feeling of sadness or depression, without being conscious of any adequate cause for it, don't take a drink of ice water, however thirsty, nor a glass of soda, nor a drink of wine, but a cup of hot tea, as hot as you can swallow comfortably; the heat is of more value than the tea itself, but both combined, are of incalculable value; if you are sitting down to a meal in this tired condition of body, and mental depression, some hot tea, taken before anything is eaten, will rouse the circulation, exhilarate the stomach, rally the spirits, and make you a different, a better, and a happier man in less than ten minutes, because the increasing debility and downward progress of the system is arrested by the warmth of the water and the active quality of the tea, until strength begins to be imparted to the system from the food taken.

It is safe to cool oneself off by dabbling the hands in cold water; safer and more natural if the water is warm, by the rapid evaporation every time the hand is lifted out of the water. But it is positively dangerous to wash the face in cold water when much heated. It is not dangerous but pleasantly efficacious if warm water is used.

Summer Clothing.

For all persons, especially invalids, and those who take cold easily, a thin material of woolen gauze, next the skin, is safest and best, because—

First, it is a non-conductor, carries heat from the body more slowly than cotton, linen, or silk; all colds are caused by the body becoming colder than natural, especially if it is made colder rapidly, and woolen material next the skin is the best thing known to prevent this rapid cooling, especially after exercise which has caused perspiration, and does not cause that disagreeable sepulchral dampness which wet linen does when it comes in contact with the skin.

The warmer the weather the more need for woolen next the skin; hence British sailors are required to wear woolen next the skin, in tropical latitudes, in summer, as the best observed protection against disease.

All garments worn next the skin during the day should be removed at night and spread out for thorough airing and drying.

Cotton is the best material to be worn next the skin at night. All changes from a heavier to a lighter clothing in summer, should be made by putting on the lighter clothing at the first dressing in the morning.

It is greatly safer for children, for invalids, and for old persons, to have too much clothing than too little.

Testimonial to the Family of Niepce de Saint Victor.

We recently noticed the death of this distinguished man. He was the nephew of Nicéphore Niepce, the first inventor of photography, and was worthy of the name he bore, for he consecrated his life to researches and discoveries in photography. Among his numerous labors may be cited the following: Researches into photographing and fixing natural colors; memoirs upon the persistence of luminous rays; heliographic process; and it is claimed for him that he was the first to take negatives upon glass, an invention that opened the way to the use of collodion, which is at the base of all actual progress in photography.

If he had taken out a patent for this discovery he would have secured a fortune to his family, but he belonged to the class who, oblivious of all selfish gain, sacrifice their lives to the good of their fellow men.

He is now dead, leaving a widow and two children without any means and with no pension, as the emoluments of his office terminated with his life. In view of these facts it is proposed to raise a fund for the support of his family. Subscriptions may be sent to the President of the Photographic Society of France, No. 9 Rue Cadet, Paris.

The Camphor-Tree of Sumatra.

Among the most luxuriant and valuable trees of the island of Sumatra the first place belongs to the *Dryobalanops camphora*. The tree is straight, extraordinarily tall, and has a gigantic crown, which often overtops the other woody giants by 100 feet or so. The stem is sometimes twenty feet thick. According to the natives there are three kinds of camphor tree, which they name "mailanguan," "marbin tungan," and "marbin targan," from the outward color of the bark, which is sometimes yellow, sometimes black, and often red. The bark is rough and grooved, and is overgrown with moss. The leaves are of a dark green, oblong oval in shape, and pointed; they smell of camphor, and are besides hard and tough. The outward form of the fruit is very like that of the acorn, but it has around it five petals; these are placed somewhat apart from each other, and the whole in form much resembles a lily. The fruit is also impregnated with camphor, and is eaten by the natives when it is well ripened and fresh. The amazing hight of the tree hinders the regular gathering, but when the tree yields its fruit, which takes place in March, April, and May, the population go out to collect it, which they speedily effect, as, if the fruit be allowed to remain four days on the ground, it sends forth a root of about the length of a finger, and becomes unfit to be eaten. Amongst other things, this fruit, prepared with sugar, furnishes a tasty comfit or article of confectionery. It is said that it is very unhealthy to remain near the camphor tree during the flowering season, because of the extraordinary hot exhalations from it during that period. The greater the age of the tree the more camphor it contains. Usually the order of the rajah is given for a number of men, say thirty, to gather camphor in the bush belonging to territory which he claims. The men appointed then seek for a place where many trees grow together; there they construct rude huts. The tree is cut down just above the roots, after which it is divided into small pieces, and these are afterwards split, upon which the camphor, which is found in hollows or crevices in the body of the tree, and, above all, in the knots and swellings of branches from the trunk, becomes visible in the form of granules or grains. The quantity of camphor yielded by a single tree seldom amounts to more than half a pound, and if we take into account the great and long-continued labor requisite in gathering it, we have the natural reply to the question why it fetches so high a price. At the same time that the camphor is gathered—that is, during the cutting down of the tree—the oil, which then drips from the cuttings, is caught in considerable quantity. It is seldom brought to market, because probably the price and the trouble of carriage are not sufficiently remunerative. Whenever the oil is offered for sale at Baros the usual price is one guilder for an ordinary quart wine-bottleful. The production of Baros camphor lessens yearly; and the profitable operation of former times, say in the year 1753, when fully 1,250 lbs. were sent from Padang to Batavia, will never return. Since time out of mind the beautiful clumps and clusters of camphor-trees have been destroyed in a ruthless manner; young and old have been felled, and as no planting or means of renewal has taken place, but the growth of the trees has been left to nature, it is not improbable that this noble species will ere long wholly disappear from Sumatra.—*Journal of Applied Science.*

The Culture of the Mushroom.

As the culture of mushrooms is attracting increased attention in this country, the following directions, found in the *English Mechanic* will be of use to those interested in this subject:

"Those who wish to succeed in their cultivation should first procure a quantity of horse droppings, free from straw and stones, and pile them into a heap, which must be patted down firmly, and allowed to heat; when well warmed all through it should be shaken out, and again made into a heap, changing the sides into the middle. After two or three of these "heatings" the dung will become sweet, which may be known by placing a piece of glass on the heap, and if the water that condenses on it is clear, the material will be fit to form into a bed. The bed may be of almost any dimensions, but a rounded form is best, as giving a greater surface from which to gather the mushrooms; some say 2 feet broad by 2 feet thick, rounded off, others 18 inches or 2 feet thick sloping to nothing. It must be put together rather firmly, and should be neither too hot nor too dry. In a few days the heap will in all probability heat violently, and when the temperature has fallen to 70° or 75° Fah., will be about the best time to put in the spawn. After the insertion of the spawn, which should be broken into pieces, the size of hens' eggs, and placed in holes about 9 in. apart, the surface of the bed should be patted together with a spade, and then covered with a layer of straw about 6 in. thick. In about ten or twelve days examine the bed, and if you do not see the thin white filaments of the mycelium spreading out from the lumps of spawn, it is certain that the heat is not sufficient, or the spawn is bad. If the former, the whole bed had better be pulled to pieces and re-made; if the latter, procure fresh spawn, which should be placed in different holes to the first. But if the spawn has begun to run you may proceed to cover the bed with an inch or an inch and a half of good loam, which should be patted close and gently watered, and the covering restored.

This form of bed will do for a cellar, outhouse, cupboard, or the open air, but if the latter it should be covered with straw, at least a foot in thickness. When the mushrooms are gathered a little earth should be placed in the holes whence they are taken. As to the kind of spawn to use, I think the French is undoubtedly the best, as what is generally bought at the seedsmen's is too hard and dry, whereas the French is in thin flakes, cut from heaps full of mycelium. Droppings obtained from a mill track, invariably contain spawn, and have only to be placed in small heaps to produce abundant crops of mushrooms. In the neighborhood of Paris these delicious fungi are grown in caves either underground, or excavated in the side of a hill, and even in deserted slate and stone quarries, as at Frepillon, Méry-sur-Oise, where at one time no fewer than 21 miles of beds were in full bearing. Of course, in these comparatively warm subterranean caves a bed does not require any covering, but yields abundant crops for two, three, and even four months.

There is, in fact, scarcely any kind of waste space where mushrooms might not be grown—in pots and old tubs under the stage of greenhouses, on shelves in stables; indeed, in any situation where sufficient dung can be placed to heat, or merely enough for the spawn to spread if artificially warmed.

Purification of Feathers, Hair, etc.

Horse hair, so-called, cannot, where the markets are competitive, be produced pure and simple—in other words, that of the buffalo, ox, bison, and pig, is proportionately intermixed. At the extremity, the epidermis, and occasionally minute portions of cuticle adhere. The curling does not destroy the tendency of ova to generate. Wool, and other material, from its naturally oily nature, is also subject to the ravages of neglected attention, *alias* moth, etc. Feathers occasionally are subject to their attack, but in a much less degree, inasmuch as these must be prepared by some process before it is possible to use them. All the inferior material used by the moderns cannot but be the hot bed, so to say, of these destroyers, inasmuch as old carpets in which they have long made their home, old clothing—in a word, the mixed refuse—etc., contribute their quota to multiply them. And now to speak of the more mystic causes—these will be manifest upon unfolding facts. "If from the body's purity the mind derives a secret and sympathetic aid," the homes of the wealthier portion of the community should be subject to special vigilance in ascertaining the condition of all bedding, and cause them to be subject to a process capable of fulfilling all its intention, in an economical as well as sanitary aspect. It will, of course, be readily conceded that the necessity of preserving the greatest immunity from all cutaneous and febrile maladies, but others of a more subitle nature demand equal attention. The process employed in manipulating is one simple and effective. 1st. Thoroughly saturating with alkalies of a certain strength. 2d. Submitting the materials to sulphur dioxide in combination with water of a certain specific gravity, so as not to destroy the material. 3d. Well steaming at a pressure of two atmospheres. 4th. Removing to rotary drying chambers, and finally to the dusting machine. By this process, feathers, hair, wool, etc., acquire a freedom from impurities, also elastic properties, and an intrinsic value not to be obtained by other means.

Tinning Iron without Fuel.

A cold process of tinning has been invented by Mr. Daubié, of Bellefontaine, France. The iron is treated by successive immersion in baths containing cold solutions of salts of tin, with the addition of a certain amount of organic matter, such as fecula or starch, which has always been found valuable, both in tinning and galvanization.

The solution patented is thus made: To each 20 gallons of water add 6 lbs. of rye flour, and let it boil for about half an hour; filter it, and afterwards add 212 lbs. of pyrophosphate of soda, 34 lbs. of crystallized salt of tin, 134 lbs. of neutral photochloride of tin, and from 3 ozs. to 4 ozs. of sulphuric acid. When the salts are dissolved the solution is distributed in eight or ten wooden vats, a little additional water being added to the first two or three of the vats. The wire is passed successively through the whole of the vats, and if great brilliancy of surface is required, also through draw plates at intervals, and the wire, while retaining all its rigidity, becomes covered with a brilliantly-polished coat of tin.

Wootz, or India Steel.

In 1819, while Faraday was an assistant in the Royal Institution, he made an analysis of wootz which attracted considerable attention, as, besides carbon, it was found to contain only silica and alumina, from which the conclusion was drawn that the peculiar property of the metal was due to the presence of silicium and aluminum. The uncertain state of analytical chemistry at the time of Faraday, says the *Journal of Applied Chemistry*, has induced Rammelsberg to repeat the analysis of wootz, and he has communicated the results of his work to the Berlin Chemical Society. The following is Rammelsberg's analysis: carbon, 0·867; silicium, 0·136; phosphorus, 0·009; sulphur, 0·002. It will be seen seen that the metal contains no trace of aluminum, and Rammelsberg doubts the existence of such a thing as aluminum steel. It is certain that the usual alloys of aluminum and iron are crystalline and brittle and not at all possessed of the properties of steel.

Aniline Photographs.

The process consists in preparing paper with bichromate of potash, to which some phosphoric acid has been added; when dry, the paper is exposed under a *positive* for a sufficient time, and when removed from the printing frame the picture is held over a dish containing a solution of aniline in benzole. The benzole in volatilizing, carries with it the vapor of aniline, and when the latter comes in contact with the unaltered bichromate on which light has *not* acted, a rich black body is produced, which is believed to be a very stable compound. Washing in water and dilute sulphuric acid now clears the lights of the prints and leaves a paper positive, which is the equivalent of a carbon print.

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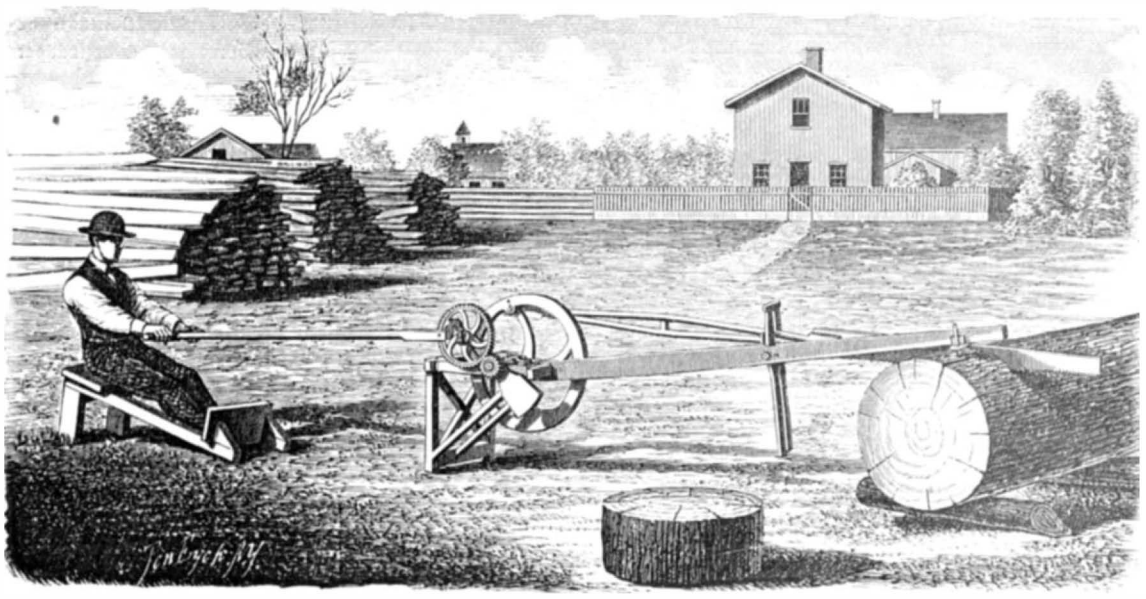
Improved Sawing Machine.

In the use of the ordinary cross-cut saw, a great waste of muscular power occurs. The weaker muscles of the shoulders and chest are chiefly employed in the propulsion of the saw, while the stronger muscles of the back, hips, and thighs are exerted to maintain the bent and fatiguing position of the body. Nor is this all, the muscles of the shoulders, chest, and arms are employed to great disadvantage on account of the leverage being all against them.

The device shown in our engraving has for its object, first, to relieve the muscles from supporting the body, and second, to add their force to those of the chest, arms, and shoulders in driving the saw, so that the power expended shall all be applied to useful work, except that necessarily absorbed by friction.

The muscles are relieved from supporting the body by seating the operator upon a suitable inclined bench, as shown, having a foot-board against which the feet rest; the position and motion of the body being precisely that of rowing. The hands grasp a cross bar upon one end of a handle or connecting rod, which is hinged to a planet-wheel, at the other end, the sun-wheel around which it revolves being keyed to the shaft of a fly wheel. The proportions of this gearing are such that four revolutions of the sun-wheel to one of the planet wheel are secured.



SMITH'S HAND-POWER SAWING MACHINE.

The fly wheel carries a crank wrist, from which a pitman passes to the saw, and gives it reciprocating motion. The vertical position of the saw in starting is secured by means of a staple driven into the log over the back of the saw, the legs of which support the saw laterally, and give it the proper direction.

The log is moreover connected to the frame of the fly wheel and sun and planet wheels by means of a timber brace having a metallic eye, through which a metallic pivot pin is driven into the timber. The machine is thus supported while it can be moved to cut at any desired angle across the log.

This description definitely applies to the saw only when used for vertical cutting. A slight modification of the parts upon which we need not dwell, adapts it to horizontal cutting in felling timber, etc.

Patented, May 3, 1870, by Addison Smith, of Perrysburg, Ohio, who may be addressed for further particulars.

THE "FARMER" FOUNTAIN.

Our engraving shows an ornamental design for a fountain for the parlor or conservatory, patented by an inventor who has made many improvements in this field.

In form it is an oval vase, 25 × 19 inches, the base forming a flower-pot, properly drained, in which vines may be planted, and trained up and around it by tying them to the projecting berries, provided for that purpose. The handles are represented by a young lady in an arbor, offering to shake hands.

There are two basins; the upper one of flint glass, shell-shaped, and flat on the bottom, to allow the fishes to sleep; the lower one of metal, rests, by an overlapping curtain, on the rim of the vase.

The pipes supplying the water pass through the stem of the vase. The other parts of the design show sufficiently for themselves.

Patented, July 12, 1870, through the Scientific American Patent Agency, by John Hegarty, of Jersey City, N. J., and manufactured by Eldridge & Co., New Haven, Conn., and 120 Nassau street, New York city, who may be addressed for further information.

What do Your Children Read?

We commend to parents the following from the *Workingman:* "A bad book, magazine, or newspaper is as dangerous to your child as a vicious companion, and will as surely corrupt his morals, and lead him away from the paths of safety. Every parent should set this thought clearly before his mind and ponder it well. Look to what your children read, and especially to the kind of papers that get into their hands, for there are now published scores of weekly papers with attractive and sensuous illustrations, that are as hurtful to young and innocent souls as poison to a healthful body.

"Many of these papers have attained large circulations, and are sowing broadcast the seeds of vice and crime. Trenching on the very borders of indecency, they corrupt the morals, taint the imagination, and allure the weak and unguarded from the paths of innocence. The danger to young persons from this cause was never so great as at this time; and every father and mother should be on guard against an enemy that is sure to meet their child.

"Our mental companions—the thoughts and feelings that dwell with us when alone, and influence our action—these are what lift us up or drag us down. If your child has pure and good mental companions he is safe; but if, through corrupt books and papers, evil thoughts and impure imaginings get into his mind, his danger is imminent.

"Look to it, then, that your children are kept as free as possible from this taint. Never bring into your house a paper or periodical that is not strictly pure, and watch carefully lest any such get into the hands of your growing-up boys."

Hollow Railway Axles.

A recent railway disaster occurred on a railway train at Newark, England, caused by an axle breaking on a freight car, whereby some eighteen persons were killed and a large amount of damage done to property and person. The axle had been in use eighteen years at least; it was 3 ½ in. in diameter at the center; up to the boss, 4½ in.; inside the boss or through the wheel, 3 15/16 in., and the shoulder was turned up square. The fracture was at the shoulder, showing another instance of the viciousness of the practice of thus turning up axles or other bearings to a sharp shoulder. They should all be rounded off smoothly, thus allowing no chance for the slightest check to be made in the metal. The English press have been discussing the cause of the accident as though it were an entirely new question, but in the United States we have long since discarded the square shoulders to axles and other heavy bearings. Sir Joseph Whitworth, in discussing the question of the best method of detecting unsoundness in railway axles, says: "The best method that can be adopted for the purpose is that of drilling a hole through the center of the axle, throughout its length, thus opening up to inspection and examination that part of the material which, in the case of ordinary manufacture, is most subject to unsoundness. The hole should be about one inch in diameter, and, with suitable mechanical arrangements, might be drilled at an average cost of about 1s. 6d. per axle. With the outside turned, and the inside thus exposed to view, a serious flaw in an axle, which is only about 4½ inches in diameter, could hardly escape discovery. The plan would also diminish the tendency of the axle to get heated, and by removing the material near the neutral axis, would, under the circumstances, reduce the internal strains and render the axle safer. It is of great importance both to give proper diameters to every portion of the length of the axle, and to avoid all approach to sudden change of diameter."

The suggestion is a good one, and we commend its practice to our engineers and mechanics.—*Railway Times.*

The Mystery of Life.

It is a simple matter of fact and of every day observation that all forms of animal work are the result of the reception and assimilation of a few cubic feet of oxygen, a few ounces of water, of starch, of fat, and of flesh. In a chemical point of view man may be defined to be something of this sort. That great authority, Professor Huxley, has lately been discussing what he calls "protoplasm," or "the physical basis of life." He seeks for that community of faculty which exists between the mossy, rock-incrusting lichen, and the painter or botanist that studies it; between "the flower which a girl wears in her hair and the blood which courses through her youthful veins." Mr. Huxley finds it in the protoplasm, the structural unit of the body, the corpuscle, the spheroidal nucleus, which, in their multiples, make up the body or the plant. But unless his statement is limited and guarded some color for materialism may be afforded by it. These make up the body, but, nevertheless, they are not the body. Suppose, to illustrate, we take the letters of the alphabet, *a, b, c, d,* we might similarly argue that because these letters occur in mathematics, metaphysical writings, and in comic songs, there is therefore something essentially mathematical, metaphysical, and comic about these letters. Again, Professor Huxley has not proved, and it is impossible for him to prove, that these protoplasms may not have essential points of difference. The facts of organic life cannot be interpreted by the ascertained laws of chemistry and physics. Physiologists cannot tell us how it is "of four cells absolutely identical in organic structure and composition, one will grow into Socrates, another into a toadstool, one into a cockchafer, another into a whale."

ANDERSON'S OIL SAFE.

Our engravings illustrate a device for the safe keeping and storage of oils or other inflammable liquids, patented, by G. D. Anderson, September 1, 1868, and which, we are informed, has come into extensive demand. It is intended to supply a want long felt in retail stores for a suitable receptacle to contain kerosene and other inflammable liquids.

Fig. 1 is a perspective view, and Fig. 2 a section of the safe. The construction is very simple. The general appearance is that of a refrigerator The oil is contained in a metallic vessel, which is inclosed in a wooden case. The interior vessel is of zinc with double-soldered joints. The bottom is made to incline from each end toward the middle into a groove, from the lowest point of which the faucet issues This structure prevents all clogging and deposit of sediment.

Fig. 1.

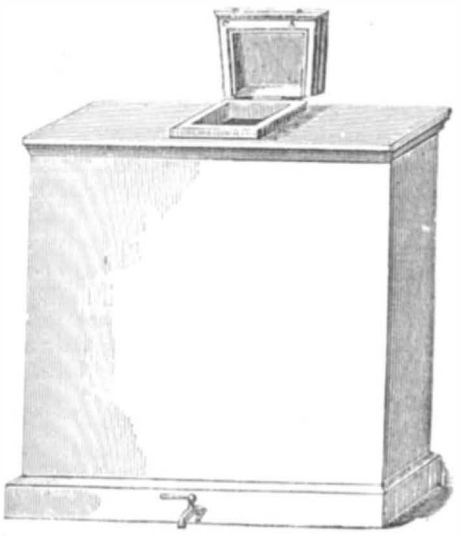
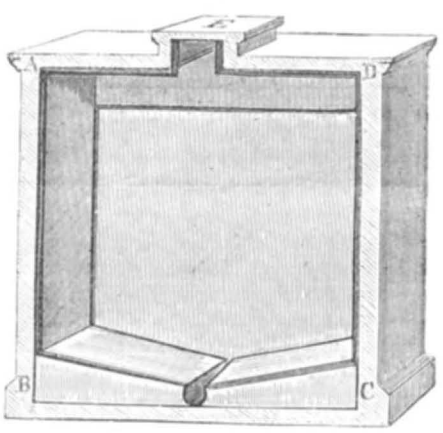


Fig. 2.



An air-tight lid is hinged to the top of the safe, so packed as to prevent egress of vapor, and easily opened and closed.

It will be seen, by reference to an advertisement in another column, that the inventor offers to sell the right for all the States except Ohio, Illinois, Indiana, and Michigan. For further information address G. D. Anderson, Peekskill, N. Y.

Morin says a man cannot perform more than a work of 58 foot-pounds per second, on an average.

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THE PRUSSIAN NEEDLE GUN AND THE FRENCH CHASSEPOT NEEDLE GUN.

Some think they see in the war that has broken out in Europe a theological significance. Others look upon it as purely an anti-Napoleonic movement, while others regard it merely as an effort upon the part of France to recover the Rhenish provinces. Doubtless the war partakes of all these characteristics more or less, but in our view the political necessities of the Napoleonic dynasty at the present moment, are the chief cause of its initiation.

He would be indeed a bold prophet who would venture to predict its duration or final result. Should the conflict be confined entirely to Prussia and France, the respective forces would appear to be nearly equal. The greater number of soldiers which Prussia can throw into the field, is counterbalanced by the power of the French navy, which numbers 402 vessels of all descrip ions, including 55 iron-clads. The whole number carry 4,680 guns.

Both sides are provided with modern field artillery and with powerful batteries of siege guns. The Prussians have Krupp's breech-loading steel rifles, the merits of which are considered questionable by some, but which it is thought by many will prove very effective when properly worked. The amount of breech-loading artillery possessed by the French seems to have been purposely concealed by that government. The *Mitrailleuse*, to perfect which large sums are reported to have been expended, has yet to prove its superiority to the Gatling gun, which has also been adopted by the French Government. It is also said that the Gatling guns have been sent to Prussia. Our readers will find an illustrated description of this gun on page 363, Vol. XXI., of the SCIENTIFIC AMERICAN. But the two weapons which will do most in deciding the result are the Prussian needle gun and the chassepot needle gun. We have before published illustrations and descriptions of these weapons, but as the subject has acquired renewed interest, we again return to it.

THE PRUSSIAN NEEDLE GUN.

The construction of the Prussian needle gun, which proved so destructive during the war of 1866, is shown in Figs. 1, 2, and 3.

Fig. 1 represents the breech piece, with its parts partly in section, contracted longitudinally. In fact this breech-piece is eleven inches long. The case, A, is screwed to the breech of the barrel, which at this point is bored out for a cartridge chamber, to the depth of the lands or grooves in the barrel proper. Inside this case is a cylindrical chamber, B, furnished with a handle and knob, C, which can be moved along a longitudinal slot in the case, having a transverse slot inclining toward the forward or muzzle end. This chamber is convexed or bored at the end, and fits over the conical end of the barrel at D. A sharp blow of the hand on the knob forces its shank into the spirally-transverse slot, and effectually closes the joint at D. Inside the chamber is a cylinder, E, containing the needle bolt, F, the spiral spring, G, and the needle, H. At H is also a plug or guide, screwed to the inside of the chamber, B. On the apex of this the cartridge rests. A spring, I, with its end catch serves to withdraw the cylinder, E, with the bolt, F. The trigger, J, is a bell-crank lever, which depresses the spring, K, and allows the cylinder and contents to be drawn to the rear. L is the powder, M the percussion wafer, N the *sabot*, and O the bullet—all enveloped in paper.

The operation of this mechanism is easily understood. The spring, I, being pressed, unlocks from the case, B, and allows the sliding back of the cylinder, E, so that the rear projection of the bolt, F, takes the spring, K, and the needle is withdrawn into its guide or sheath, H. The chamber, B, is then unlocked by the knob, C, and slid back so that the front projection of F catches the spring, K, thus compressing the spiral, G. The rear of the barrel is thus opened, and the cartridge can be introduced.

The chamber is then moved forward and locked against the barrel, and the spring, I, is pressed down and the needle bolt moved forward, so that the rear projection rests against the spring, K, and the needle rests against the rear of the cartridge, and the piece is ready for firing. The front of the needle bolt is recessed, and receives a leather washer, designed to prevent the escape of the products of the gas combustion to the cylinder, B—an office it performs but inefficiently.

We have expressed the opinion that this gun, although undoubtedly superior to any muzzle-loading gun in destructive efficiency, is far inferior to many American breech-loaders.

The following quotation from the letter of an able correspondent upon the subject sets forth its defects in a strong light:

"The needle gun is a clumsy, unsightly, heavy, and expensive gun compared to many American breech-loaders. It is complicated in its parts, and delicate in its construction. The breech piece, which contains the breech-loading mechanism, is enormously long, extending not less than eleven inches to the rear of the cartridge chamber. The gas check performs its functions badly, as there is so much escape of gas that the gun cannot be fired one hundred rounds without being cleaned. There is also considerable escape of gas into the mechanism through the needle-hole in the face of the breech-closer. This escape of gas soon fills the chamber in the cylindrical breech-closer, which contains the needle pin and spiral spring, with a residuum of burned powder, and seriously impedes their action.

"When the cylindrical breech-closer is shoved forward, the trigger, having taken hold of the needle pin from below, retains it to the rear, and thus compresses the spiral spring, so that the simple act of closing the breech, cocks the piece, and it is only necessary to pull the trigger to fire it. This arrangement is a convenient one for the soldier, and facilitates the firing but it is an objectionable feature in a military arm, because when loaded it must necessarily remain at full cock. It is true there is a means provided for locking the needle pin in this position to prevent accident, but if the soldier should forget or neglect to avail himself of it, then serious accident is liable to take place at any time.

"The ammunition for the needle gun is complicated, expensive, and difficult to make up, considerable special machinery being required for that purpose. The needle gun cannot be fired more than half as many rounds per minute as most of the American metallic-cartridge guns."

Improvements have been made upon this arm which somewhat lessens the force of the above objections, but it is still undoubtedly inferior to some other breech-loaders. The general principle of its construction remains essentially that shown in the engraving.

Fig. 1

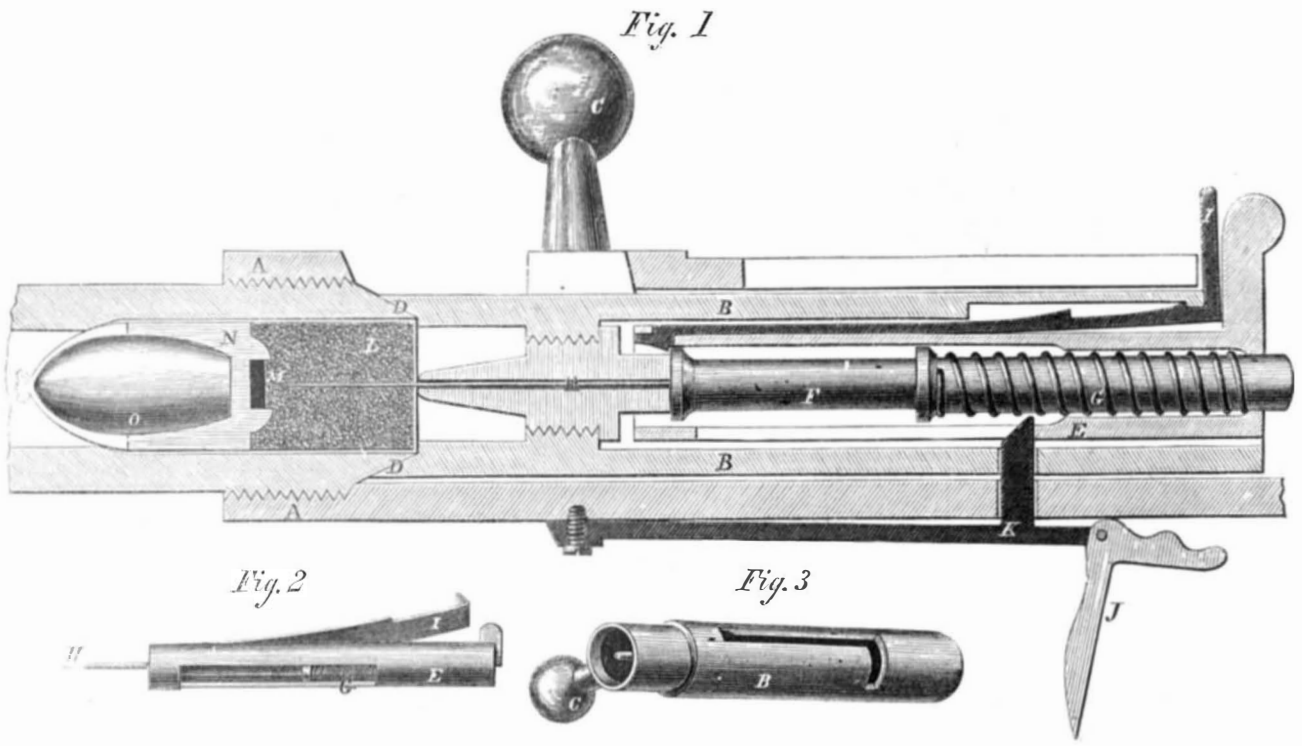


Fig. 2

Fig. 3

The chassepot needle gun is considered by some to be an advance upon the Prussian arm. Its construction is shown in Figs. 4 and 5.

An opening on the right hand of the chamber, A, permits the insertion of the cartridge. This chamber is filled by the movable cylinder, A′, which may be moved back or forward by means of the handle and knob, B. The cylinder, A′, surrounds the shaft, C, and can be revolved around the same. It contains the spring by which the needle is propelled. The rear end of the shaft, C, is made in the shape of a handle, D. The spring is compressed when the handle, D, is drawn back. The shoulder, *a*, on the shaft, C′, comes in contact with the cylinder, A′, when the arm is at rest. When loaded and ready for firing, the two parts are drawn asunder. The shaft, C, also serves to protect the needle which is surrounded by the same and is forced out of the front end of the shaft as soon as the trigger is pulled.

Fig. 4

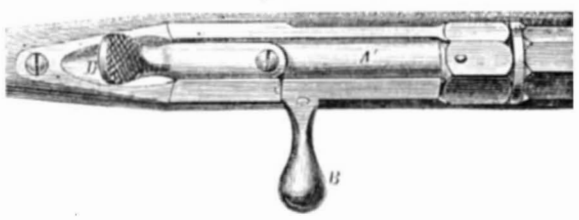
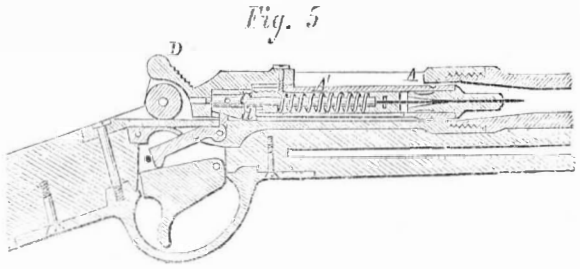


Fig. 5



After the cartridge has been inserted, the knob, B, is pressed forward, and is then laid over to the right hand side, as shown in Fig. 4. The aperture, A, is now closed. By the first of these two movements the cylinder, A′, is moved forward, thereby forcing the cartridge into the breech; the second movement secures the cylinder, so that it cannot be thrown back by the force of the explosion. The pulling the trigger releases the spiral spring, which then forces the needle through the percussion wafer. It is claimed that this gun cannot be clogged up as easily as the Prussian needle gun, and is more substantially built. But it is constructed on the same principle in almost every other respect.

It will be seen that these arms must be nearly equal in destructive power, and that when opposed to each other terrible carnage must inevitably result. That this carnage can now be averted by the intervention of other powers, seems hopeless, and it is probable that some of the bloodiest battles ever recorded will sadden the annals of the year 1870.

Railway Torpedo.

This useful little device is often of great value in railway operation. It is a small circular tin can filled with detonating powder, and is fastened to the rail by tin straps bent round the rail.

The Philadelphia and Reading Railroad Company use on an average 35,000 torpedoes annually on their numerous roads. These explosives are called "fog signals," and are used in heavy weather, when the signal lights on the towers cannot be seen from the engine. They are intended to prevent accidents, and have done good service in that respect since their introduction. To make them thoroughly effective three are placed on the track a short distance apart, so that if one should fail to make a report, two would remain to perform that service. The explosion of a torpedo under the wheels of an engine is a warning of impending danger, and the engineer always stops the train in obedience to it.

Coal Dust.

Although many attempts to consolidate coal dust so as to render it economical as fuel have been made, none have, we believe, been able to so utilize it except where it is already transported to trade centers. It would seem, however, that there have been bidders for the great dust heaps in the Pennsylvania coal regions. The New York *Times* in a recent article says the deposits of coal dust in these regions have grown into immense mountains—a burden to the proprietors, and a snare for unwary speculation. One of these, of unusually enticing bulk, has been sold, it is said, over and over again, to ingenious capitalists, chiefly from the Eastern states, and of the *Toodles* pattern. They bought the dust pile because it was cheap for its size, and, from its very apparent worthlessness, suggested immense, if vague, possibilities of honest pennies. But the purchase has always been abandoned in despair by one after another of these misguided financiers. One, indeed, conceived the brilliant idea of sifting his mountain for the solid coal scattered through it, and after procuring an army of carts, and working zealously for a week, really obtained a tun or two of admirable coal. As he ascertained, however, that his sifted coal cost about three times per tun what he would have to pay at the mines, he sagaciously concluded that his undertaking was less profitable than laborious, and so gave it up and fled.

How the Chinese Cook Rice.

The editor of the *American Grocer* states that he has recently paid a visit to the Chinese colony of shoemakers, at North Adams, Mass., and has obtained from them the Chinese method of cooking rice. The process of boiling one pound of rice is as follows: Take a clean stew-pan, with a close-fitting top, then take a clean piece of white muslin, large enough to cover over the top of the pan and hang down inside nearly to, but not in contact with the bottom. Into the sack so formed place the rice, pour over it two cupfuls of water, and put on the top of the stew-pan, so as to hold up the muslin bag inside, and fit tight all round. Place the pan on a slow fire, and the steam generated from the water will cook the rice. Each grain, it is stated, will come out of the boiler as dry and distinct as if just taken from the hull. More water may be poured into the pan if necessary, but only sufficient to keep up the steam till the rice is cooked. The pan must not be heated so hot as to cause the steam to blow off the lid. The Chinese at North Adams, if they look about a little, will find Yankee vessels made of tin containing perforated shelves or diaphragms for cooking rice and other articles by steam, on the same principle as the muslin sack, and much more convenient.

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Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Our Dwellings.

Messrs. Editors:—Your correspondent, "F. G. W.," may be about right in the statement made in No. 4, present volume, that "two thirds of our dwelling houses are not put up" in a very workmanlike manner; but his field of observation must be quite limited, or he would not say that the "greatest deficiency is in the foundation supports."

As a rule, builders do not slight their work in those points where the mass of persons inexperienced in such matters could readily detect the fault. Many a poorly-built house is pronounced "built of the best materials, and in the best manner" by the purchaser and others, because the outside looks well when new.

No builder, no matter how cheap a house he was erecting, could afford to allow the flooring to settle "three inches carrying down all the partitions with them, to save the very trifling expense of a few cheap supports. Such instances of "penny wise and pound foolish" economy must be rare.

Some of the real faults of our system of building are these: The lumber is not seasoned. There is perhaps not a single instance in this country of a lumber yard where they "stick up" the timber from which the house frames are made. It is sawed "green,"and kept in a solid pile. If any air gets to it, it is accidental, and not intentional. To make the best kind of a house, every piece of lumber in it except the laths should be perfectly dry. In what we call good houses those parts exposed to view are generally of good stock and properly season; but a dry frame is of more consequence than dry doors. The latter can be readily repaired or replaced, the former cannot. The timber used is too narrow. Every wooden house of medium size should have 2×6 outside studding, instead of 2×4. Instead of 2×6 and 2×8 flooring joists, they should be 2×10 and 2×12.

In those sections of our country where the dwellings are clapboarded, and the floors laid double, the covering boards and under floor should be every inch sound, free from knot holes, shakes, and waney edges. When laid they should be jointed to make tight work. As a rule, anything that will hold a nail, the "refuse" and all "odds and ends" are worked in; and those parts, which, above all others, should be well done, are the poorest in the building. Our practice says: "No matter, it is out of sight." Why don't we have houses made from seasoned lumber? Simply because we can't wait for it to dry, and don't want to pay the cost of drying.

When the occupants of a new house find the doors and windows "binding" and "sticking;" and the wood-work in various places showing large cracks, they generally denounce the carpenter. He could not help it—the lumber was not seasoned.

These are but three of the many defects in our American system of house-building; the temptation to mention others is great, but the fact that I have already trespassed too much upon your space restrains me. In most parts of our land we have the best building materials in the world, and plenty of skilled workmen, but we are in too great a hurry to build good houses.

Beta.

Steamboat Speed.

Messrs. Editors:—The ocean, the North River, and the Sound, and the West's great arteries of commerce, the Mississippi and its tributaries, since the advent of the first competing lines of steamboats, have ever been the scenes of the most exciting and enthusiastic competition in the matter of speed.

The desire to outstrip competitors has repeatedly attracted the attention of legislators, and penal enactments have put an end to the dangers of constantly recurring races between rival lines, until, become a dead letter from age, their wholesome provisions are forgotten, their penalties disregarded, and the whole programme of transgression and threatened punishment is again performed for the benefit of the community.

The Mississippi and its tributaries, affording, as they do, fitting opportunities for this species of emulation or opposition, have grown to be proverbial throughout the world as steamboat race courses. To speak to an European at home of a Mississipi boat race brings to his mind at once a vivid picture in high colors, depicting horrible death or intense agony, the result of an act, which, to river men in America, appears far less dangerous or reprehensible than the railway passenger system of the Continent, where escape from the car, in case of danger, is impossible, save through the key in the hands of the guard.

The question of the relative speed of rival boats has again broken out on the Western waters, in the late trial of speed between the *R. E. Lee*, built at Louisville, and the *Natchez*, built at Cincinnati, from New Orleans to Cairo. There was no advertised race, no hand-bills, or "dodgers," but the fact was patent to every steamboat man from Pittsburgh to Cairo, and from St. Paul to the Gulf of Mexico, that a race was on the carpet, and as the day approached, the excitement became intense, and thousands of dollars were deposited as guarantees of their faith by friends to the parties in the race.

Both boats were "light and loose;" and preparations had been made for taking fuel without loss of time, from barges. The most combustible material in reach was procured, and everything done to insure victory by both parties. The telegraph wires worked day and night to post the friends of the contestants, and a general election could hardly have produced more excitement along the line of the Mississippi and Ohio rivers.

Here is the result: The *R. E. Lee* made the run from New Orleans to St. Louis in three days, eighteen hours, and fourteen minutes, beating the *Natchez*, in the race of 1,200 miles, only three hours and forty-four minutes.

For reference, let us look at the following comparative table of the speed of several fast boats of past years.

FROM NEW ORLEANS TO NATCHEZ—DISTANCE, 295 MILES.

				Hours.	Min.
August,	1844—Old Sultana	made the run	in	19	45
"	1851—Magnolia	" "	"	19	50
May,	1853—A. L. Shotwell	" "	"	19	49
"	1853—Southern Belle	" "	"	20	8
"	1853—Princess No. 4	" "	"	20	26
"	1853—Eclipse	" "	"	19	47
August,	1855—New Princess	" "	"	18	53
"	1856— "	" "	"	17	30
June,	1870—Natchez	" "	"	17	50
July,	1870—R. E. Lee	" "	"	17	11
"	1870—Natchez	" "	"	17	14

Here is food for the thoughts of inventors and river men. In the past twenty-six years, while almost every other branch of mechanical appliance has made giant strides toward perfection, the steamboat, either through ignorance or want of inducement, or something, has scarcely advanced at a snail's pace. The steam engine—the motive power—has kept pace with other advancement; but the boat still lags, and why? Is it not because the model, which is nearly the same to-day that it was a quarter of a century since, is faulty? In the fastest time of to-day there is, with all the modern improvements in machinery, a gain over the fastest time of 1844, of only two and a half hours in a run of two hundred and ninety-five miles. Where does the trouble lie, and who will apply the remedy?

C. C. Haskins.

Sinking Valley.

Messrs. Editors:—Sinking Valley, of Blair county, Pa., is situated between the Bush and Canoe Mountains, and is a continuation of Nittany Valley, Center County, Pa. It is about eight miles long, and from four to five miles wide in its widest parts. Sinking Valley took its name from the fact that the water rises and sinks in the valley. We first find in it two sinks, which have been sounded to the depth of 130 feet without finding bottom. These sinks are about 30 feet apart, and it is supposed that they are connected at the bottom. The water in these sinks is fresh limestone spring water. The water rises above ground at a distance of a quarter of a mile, and flows about two or three rods, when it enters a cave, whose mouth is 30 feet wide and 10 feet high. This cave has been explored for about half a mile, at which point the rocks come close to the water, and here may be heard a sound like the falling of water.

One mile below the cave the water rises at the Arch Spring, which is about 60 feet in diameter, and flows through an arch of limestone rocks. The arch is 35 or 40 feet long, 10 or 12 feet wide, and from 5 to 6 feet above the water. This spring drives a saw mill, and a grist mill which has four run of stones.

Five rods below the mill the water sinks again, this time very gradually. It runs into a pool and never seems to gain any ground, but as fast as it comes it sinks to unknown regions. When the water is clear, the bottom can be seen covered with round sand stones. The water is only 3 to 4 feet deep where it sinks, and when very low it is only 10 or 12 inches deep. This water rises again on the other side of the Canoe Mountain, passes down a ravine, and empties into the Juniata river, at Water Street, Huntingdon county, Penn. The proof that this is the same water is that when the saw mill at Arch Spring saws, sawdust rises on the stream on the other side of Canoe Mountain.

The rocks of Sinking Valley are the No. 2 formation, of Roger's first report, and Auroral of his final report, being the same formation which is known in New York as the Trenton and Black River limestone. An anticlinal axis runs through the valley, to the west of which the limestone dips under the Bush Mountain, and to the east under Canoe Mountain. The strata, next the auroral limestone, are schist or slate and Red River sandstone.

The auroral limestone in the valley varies from ½ to ¾ mile in thickness, and a considerable amount of zinc and lead is found in it. These ores were discovered by the French, in 1750, or rather disclosed to them by the Indians, as they could always procure an abundance of lead almost pure. But the Indians, true to their craft, kept the precise location of the lead mines a secret.

The earliest account of any permanent settlers in the Valley is in 1760, and in 1763 quite a number took up their residence there, but without purchasing the lands. The attention of the Council was called to the existence of lead in Sinking Valley, in a letter from Major General John Armstrong to President Wharton, dated Yorktown, Feb. 23, 1778, in which he stated that Mr. Harman Husbands, a member of the Assembly for Penn., had some knowledge of a lead mine in Sinking Valley, and suggested that it should be seized and held by the State. The Council soon took the suggestion of General Armstrong, and resolved that General Daniel Roberdeau, then a member of Congress, should go to Carlisle, and make the necessary arrangements. From this place he wrote on the 17th of April, 1778, stating the great importance of going ahead, and asking for forces and $1,200·00, and some provisions. On April 23d, he wrote from Standing Stone, now Huntingdon, and, after hard fighting, he arrived in Sinking Valley, April 27th, of the same year. Fort Roberdeau was erected, and was supplied with some muskets and a pair of cannon.

It is uncertain how long the mines were carried on by the Government, but probably not longer than the fall of 1779. What the total yield of lead was during that time we cannot ascertain. There must have been some kind of a bargain existing between the Government and Roberdeau for taking out lead, as his letter of Nov. 10, 1779, to President Reed, demands payment for ten hundred pounds of lead, at six dollars per pound (Continental money). This epistle fixes nearly the time when General Roberdeau abandoned the mines. The miners attempted to carry on operations for themselves, but soon gave it up on account of the immense expense of mining and smelting the ore.

In the early part of the present century, the lower mines, near the little Juniata River, known now as the Pine Hill, were opened under the superintendence of Mr. Sinclair, but were owned by Messrs. Musser and Wells. Three deep shafts were sunk on the side of Pine Hill, and a drift in the side of the hill, some 300 feet long, 6 feet high, and 6 feet wide, was excavated. These works were very expensive, and not profitable.

In 1821, the mines were visited by some parties from Montgomery county, Pa., with the intention of working them, but they concluded not to make the attempt, as they could not manufacture the lead so as to compete with Galena mines.

In 1852, some enterprising New Yorkers prospected the upper mines, and found what they supposed sufficient encouragement to go ahead and work them. They sunk several shafts, and found some ore, and a stock company was formed under the name of Sinking Valley Lead Mining Company. The stock figured among the bulls and bears of Wall street, New York, and considerable blowing was done about building extensive furnaces for smelting; but suddenly, one fine day, the ore was played out.

In 1862, a stock company, under the name of Keystone Zinc Company, opened the mine on Pine Hill, and was successful in finding sufficient zinc and lead ore to justify them in building an oxide furnace at Birmingham, on the Blair county side of the river. The works were built in 1866, under the superintendence of Mr. Nathan Bartlett. They consisted of eight oxide furnaces.

In 1868, four desulphurizing furnaces were put up under the superintendence of Mr. Ayer Bartlett, son of Mr. Nathan Bartlett. The following is a description of the working of the furnaces, and an analysis of the ore: The ore is put into a kiln, which somewhat resembles a lime kiln, where it is roasted, and the sulphuret of hydrogen is driven off, after which it is crushed or ground. It is then taken to the desulphurizing furnaces which are three in number, each 18 inches in hight, 15 feet long, and 6 feet wide. The ore is first spread evenly over the floor of the upper oven, where it remains several hours. It is then drawn down to the middle oven, and fresh ore is put on the upper one. From the middle oven it is drawn into the lower one, and the ore that is in the upper furnace is drawn into the middle one, while fresh ore is put into the upper oven. The work of these ovens is to drive off the sulphur.

The ore is taken out of the lower oven, and mixed with 60 per cent of nut coal, and charged, through doors in the side, into the oxide furnaces, which are 16 feet long and 8 feet wide. These oxide furnaces have perforated bottoms, to allow cold air to enter. The air is forced in by a blower. The ore is heated to a white heat, and the zinc goes off in vapor, and carries the lead with it.

The fumes pass now into a cooling chamber, 10 feet long, 8 feet wide, and 30 feet high. From this they are drawn by an exhausting blower through a sheet iron pipe, 4 feet in diameter, and 50 feet in length, which opens into a room 30 feet long, 15 feet wide, and 25 feet high; thence into the bag room, which has three rows of muslin bags. The horizontal bags are 80 feet long, and every six feet there are perpendicular bags which are 30 feet long. At the bottom are barrels to catch the oxide as it is precipitated. The oxide is now packed in barrels, and sent to Philadelphia to be ground into paint.

The oxide is of a beautiful snow-white color. The capacity of these works is 14 tuns of ore per day. The ore is the sulphuret of zinc and lead, with sulphur, limestone, sand, and some "Black Jack." It yields 43 per cent of oxide, which contains 20 per cent of lead.

The works cover an acre of ground. In connection with the works there are five large lime kilns, which ship daily 600 bushels of lime to the Natrona Soda Works, Natrona, Pa.

Frank B. Isett, B. S. A.

Hollidaysburg, Pa.

Speed of Large Circular Saws.

Messrs. Editors:—Noticing a communication in your paper from C. H. Crane, of Greenville, Ala., on the speed of large circular saws, and fearing it might have a bad effect where they are not much used, I have thought it would be well to state some facts that I have learned from long experience in setting up and running circular saw mills.

The highest speed they should ever run is 9,000 feet per minute, for the periphery of saws, unless hammered expressly for a higher velocity. I find that there are ten mills speeded too high for the power, where there is one speeded too low. This is especially the case with water mills run without governors. The speed of all water wheels is given at their working velocity, or about three fourths of the speed they will attain when running free without load. Some saws will bear more speed than others, but, as they are generally hammered, 9,000 feet per minute, when not in the cut, give speed enough for the saws of water mills. Running at that rate, a 50-inch saw, before it had got through a log of fair size, would be found to make not far from 500 revolutions per minute.

I find most of the water mills in the country, where there is a limited supply of water, lack for power and are speeded too high, and are, consequently, running on light feed and doing a small amount of business. In such cases it would be better to reduce the speed and carry more feed, doing a greater business with less wear of saw.

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A 50 inch saw, with 26 teeth, if kept in good order, will bear to run on two-inch feed in spruce or hemlock, and will cut nearly as smooth as if run on only one-inch feed, and will take but a little more power. The timber here is spruce and hemlock, and generally quite small. I think we can saw more logs than Mr. Crane, if not as many feet, and run our saw at a very much lower speed.

A circular board mill, invented and patented by me (Lane, Pitkin & Brock, manufacturers), running near here, recently cut 307 spruce logs, 12 feet long, making 20,000 feet of 1¼-inch plank, between the hours of 4½ o'clock in the morning, and 7½ o'clock in the evening. The mill used a 50-inch saw, ran 500 turns per minute, and was driven by an engine, 13×24 cylinder, 93 revolutions per minute. The mill was operated by three men only—a sawyer, who runs the mill and sets the log, one man to take away boards and slabs, and one to assist in rolling on, turning, and dogging the logs.

Montpelier, Vt. DENNIS LANE.

Snake Stones.

The power of the imagination to excite as well as to cure diseases of the human system has been experienced from the remotest generations, and a knowledge of this power is sometimes employed to advantage by intelligent physicians. From it have also sprung some of the most absurd as well as remarkable delusions. Among these is the belief that certain charms or mysterious influences reside in various objects, animate and inanimate. The Indian finds "a great medicine" in peculiar stones and other grotesque things, which he uses to heal all manner of distempers. These delusions are not confined to savage life, but exist among all civilized races, flourishing best in communities where the exact sciences have made the least progress.

The so-called snake or mad stone belongs to the above medicine class. Some of its believers imagine that it is endowed with supernatural qualities, by which it works wonders and distinguishes itself above all other pieces of rock in the universe. The most extravagant stories concerning these stones are annually published in the papers, many of them vouched for by the most respectable people.

Here is a communication sent to us by a lady from Washington, Ga.:

MESSRS. EDITORS:—Most people have probably seen now and then in the newspapers accounts of certain magical pebbles or stones which are said to act as antidotes to animal virus, and nine out of ten readers, no doubt regard all such stories as mere inventions of some Bohemian Munchausen desirous of gaining notoriety for his paper, or as the ingenious advertising dodge of some enterprising quack bent upon fooling old women and swindling ignorant people out of their money. For my own part I confess I was, for a long time, inclined to look upon the existence of such talismans as little less apochryphal than ancient traditions concerning the philosopher's stone; and my incredulity, after arriving at years of discretion, was rather strengthened by the recollection of having heard from the negroes, during my childhood, marvelous tales of the healing wonders wrought by certain rare stones which they averred were occasionally found in the bellies of very old stags. As the marvels related of these *mad stones* or *snake stones*, as they are called, were always associated in my mind with stories of talking rabbits and tar babies and other wonders of negro mythology, and like them rested, if I mistake not, mainly upon the authority of a little black urchin named Isaac, who used to enjoy bodily encounters with the devil, and see visions of red lions under the kitchen steps, it is not to be wondered at that my mature judgment was very chary of accepting newspaper accounts of a substance that seemed to belong altogether to Fableland.

Of late years, however, my attention has been more seriously attracted toward the subject of these wonderful talismans by bearing of one in the possession of a Mr. Albert Gibson, of Columbia county, Georgia, a gentleman of wealth and respectability, who has never used his singular heirloom as a means for getting money, and therefore has had no reason for advertising or giving notoriety to its existence. As he is very generous, however, in allowing his neighbors to benefit gratuitously by its healing powers, in case of snake bites or mad dogs, its light has not been altogether hidden under a bushel. Being the first "snake stone" I ever heard of which could boast "a local habitation and a name," it inspired some respect as well as curiosity, both of which increased as I continued to hear such authenticated accounts of undoubted cures performed by it upon persons infected with animal poisons. Finally my interest became so much excited that I determined to write to a gentleman of high standing in the county, a neighbor of Mr. Gibson's, for a full description of the wonder. As his account is very circumstantial and interesting, I give it entire, merely omitting such parts of the letter as relate to private or personal matters, and are therefore of no interest to the public. The writer is a gentleman of the highest integrity, as well as of a liberal education and extensive culture, and his word may therefore be received without hesitation or reserve. Here is the letter:

"APPLING, GA., June 25, 1870.

"DEAR MISS ——:—Yours of the 27th ult. was received by due course of mail, and should have been answered at once but for my inability to get an immediate sight of the celebrated snake stone.

"Mr. Gibson, the owner, never permits it to be carried from home, unless he goes with it. He brought it over once when I was absent, and it was not convenient for him to come again until to-day. * * * *

"The name given to this celebrated talisman is, in my judgment, a solecism. It is, I think, a compound of unknown substances and quantities. In form it is a parallelogram, about 1 inch long, ⅘ of an inch in width, and ⅕ of an inch thick, weighs 54 grains, and is very porous. The outward surface is of a whitish gray color, except the side applied to wounds, which is a black irregular surface. When broken (as this has been) the inner parts present a deep blue color, like indigo, which it resembles when pulverized. It has been in the family of the present possessor for more than a century, and is said to have been brought from the East Indies. Some years ago, I saw in "Niles' Register" an account of a similar stone, and these two are the only ones I have ever heard of.

"If human testimony is to be believed, the effect upon animal virus is wonderful indeed. The mode of application, if the bite be recent, is to apply the stone directly to the wound. If any considerable time has elapsed, and the wound healed, to scarify, and then apply the stone. In all cases it is immersed in tepid water. If there be any virus in the person, the stone adheres to the wound until the poison is extracted, or it becomes fully charged. It then drops off, and by again immersing in warm water, it is cleansed, and the virus may be seen exuding from the pores.

"The applications are repeated until the stone refuses to adhere. It has never failed in a single instance to effect a perfect cure. It is alike efficacious in snake bites and wounds from rabid animals, and has been applied in hundreds of cases. Some years since a negro man was sent to Mr. Gibson from the neighborhood of Columbus, who had been bitten by a snake eleven weeks before. He came here with one of his limbs greatly enlarged, and was unable to walk, but in three days after the stone was applied, he was able to go into the field and work as usual, and in a week was sent home perfectly well.

"A brother of the late Judge Thomas, who now resides in Augusta, was once bitten by a rabid dog, and this stone applied soon thereafter to the wound; he never experienced any symptoms of hydrophobia, while the cattle and dogs bitten at the same time on the same plantation, became in a few days rabid. I could mention numerous equally well-attested cases.

"No analysis has ever been made of this stone, as it is called. Mr. Gibson has a small piece that was broken off some years ago, and says he intends to have it analyzed.

"Very truly yours, etc., "C. H. S."

It is to be hoped the owner of the remarkable curiosity will carry out his intention of submitting the broken bit to a careful analysis. It is true that thus far the dissecting analysis of many precious stones, has led to no practical results of the nature anticipated by those deluded souls who spent their lives in searching after the philosopher's stone, and it is possible that an analysis of this "snake stone" might prove equally futile—still the experiment is worth trying. Nor should the tradition regarding the existence of such in the stomachs of deer be wholly disregarded, since it seems not altogether certain that this remarkable substance is literally a stone.

If the inhabitants of countries infested with venomous insects and reptiles could be supplied with bracelets or seal rings possessing such magic virtue as antidotes to animal poison, rattlesnakes, cobras, and tarantulas would cease to be things of terror to the pioneer, and the seed of the serpent need never again, in a literal sense at least, triumph over the seed of the woman. ELZEY HAY.

Washington, Ga.

EFFECT OF THE MADSTONE.—A letter to the Bloomington *Pantagraph* says: "Returning home from Bloomington last Saturday evening, I met at Normal a gentleman from Henry county, on his way from Lincoln, where he had been with his daughter, aged eleven years, to have the so-called madstone applied to her foot for the bite of a mad dog, which was inflicted on her last Sunday week. The stone was applied at one o'clock last Thursday morning, and the father told me that during its application the wound, which, though severe, had not been previously painful, became severely so, and a stench almost unbearable filled the room. When taken off the wound the stone was placed in water, on which a green scum arose, like that seen on the surface of stagnant pools."

THE MAD STONE DELUSION—DEATH FROM HYDROPHOBIA.—Mr. John Sayers, a laborer in the North Missouri Railroad car shop, died, yesterday morning, of hydrophobia. As the facts connected with the unfortunate event possess a peculiar interest at this season of the year, we give a brief narration of the circumstances connected with the case: Sayers was a married man thirty years of age, of a robust and powerful frame, and until recently in very good health. On the 24th of May a little poodle dog belonging to him was fighting with another dog, when he attempted to separate them. In doing so his own dog bit him on the inside fleshy part of the hand, near the thumb. Deceased felt some pain from the injury, and went to a man in St. Charles who had what is known as a "mad stone," and it was applied twice. The second time it is said to have adhered twenty minutes. About twelve days ago Sayers accidently knocked the skin off the place on the hand where the cut had been, and soon after felt an acute pain which extended to the shoulder. The pain increased and on Saturday he was obliged to quit. On Monday he went to Dr. Gallagher, and on Tuesday he said the pain had left his arm. His symptons subsequently were not altogether such as usually accompany hydrophobia. He was not violent or wild, but exhibited a deadly aversion to water. He could not drink it, but was able to take some wine. On Wednesday evening a change took place in his condition, and he said he felt he was going to die. A medical gentleman saw him at 9 o'clock, but he thought there was no danger then. For about an hour before his death, Sayers talked in an excited and incoherent manner. He died yesterday morning at half-past 2, and was buried in the afternoon. He leaves a wife and one child. The case is a sad one, and illustrates the horrible danger of a dog-bite in the summer season, and the necessity of taking proper measures to prevent possible results when there is any reason to believe the dog mad. It further tends to show that the virtues of the "mad stone," in which so many believe, furnish but a poor guarantee of a cure, and if it helps to explode the humbug and lead people to resort to the only safe measures, cutting out the part and severe cauterization, it will not have been entirely barren of fruits.—*Missouri Republican, July* 22.

An Undeserved Credit.

MESSRS. EDITORS:—In accrediting the invention of a dry dock, described on page 384, last volume of the SCIENTIFIC AMERICAN, to an English source, you unintentionally, no doubt, did an American inventor injustice. I inclose you a copy of a patent obtained through your agency July 6, 1869, for me. The following extract from the specification will show that the "English inventor" referred to has been either pirating my invention or has, without knowing it, reinvented it: "My invention relates to a new and improved method of constructing coffer-dams for building piers and other submarine structures, and in making the same convertible into other forms for raising sunken vessels. It consists in forming the coffer-dam in two or more sections, the sides of which are partitioned off into water and air tight compartments, each section having a removable side, and all the sides being provided with suitable tubes and other appliances for filling the compartments with either air or water at all times, whereby the section may be submerged or floated as may be desired. It also consists in so constructing the coffer-dam that it may be made (with two of its sections) to inclose a sunken vessel, thereby affording means for raising the same."

By inserting this communication you will do an act of justice to an old client. SAMUEL LEWIS.

Williamsburg, N. Y.

Bartlett Lead and Ozone.

MESSRS. EDITORS:—Your correspondent R. H. desires to know "how ozone can be productive of any one of the peculiarities attributed to Bartlett lead in the article of July 16th, and how ozone exists in the compound."

The peculiarities there stated are that Bartlett lead, "when mixed with oil or spirits of turpentine, does not settle as other paints; that a building painted with it bleaches whiter instead of turning yellow; that when mixed and exposed to the air it thickens; and that it has a gloss unknown to any other pigment."

I suppose your correspondent knows what ozone is thought to be—that it is altered oxygen, in plain English. Oxygen may be altered by various causes; electricity is one of these. It has been pretty well settled that ozone is the bleaching principle of oxygen, or that oxygen altered to ozone will bleach; that in its prime state it will not. It is settled among most chemists that the oxygen contained in the metallic acids which form combinations with other metals and the alkalies is in the form of ozone. The article states Bartlett lead to be, in great measure, at least, a plumbate of zinc. This being so, no one but a person bitterly prejudiced would deny the presence of ozone. H. E. C.

Destruction of Fish by Toads.

MESSRS. EDITORS:—On the 410th page, last volume, of of your journal, is an article on the habits of the toad (*Bufo calamita*) in which the reader is left to conjecture much that might have been made intelligible in a few words. The toad never *attacks* any animal, not even a fish, in the sense argued by the writer of the article alluded to above; and it is only the male toad that attaches himself to fishes in the manner described, and only in that season of the year when the female deposits her spawn, the vivification of which depends on that habit of the male, a perversion of which sometimes causes him to attach himself to any moving object that comes within his reach. This may be verified in any pool of water where toads congregate in summer, in this country as well as in Europe.

It is a subject of curious reflection to find a habit essential to the continuation of one race of beings incidentally concerned in the destruction of another race.

Mohawk, N. Y. CHRISTOPHER JENKINS.

Lowest Line of Perpetual Snow.

MESSRS. EDITORS:—The lowest line of perpetual snow known is at the Gulf of Penas, on the west coast of Patagonia, latitude 47° south; that line is about 2,700 feet above the water.

The weather in this particular region is regarded as the most rugged and boisterous of the whole south portion of South America. It is seldom there is a bright and pleasant day during the year. Storms of wind, rain, or snow prevail, and the exception is their absence.

S. P. JOSEPH.

A Dangerous Practice.

It ought to be known that the practice employed by some of unsoldering the tops of fruit cans by means of heat, is attended with danger. The Providence *Press* says that the following singular accident recently took place in the kitchen of a gentleman of that city: While the cook was getting dinner she placed a can of tomato soup upon the range to to warm, as she had been in the habit of doing, with live coals upon the little round cover in the top of the can for the purpose of melting the solder. Instead of the solder melting as usual, however, the can in a few moments exploded with a loud report, blowing a part of it across the room, scattering scalding soup in all directions, and over everything—ceiling, walls, and freshly-ironed clothes, and hurling live coals about the floor, and even as far off as upon a table on the opposite side of the kitchen. The cook, who, fortunately, was not near the range, and who was the only person in the room at the moment, was severely scalded in the face and upon the neck and arms, by the flying soup.

The proper way to open such cans is to cut out the top. Our inventors have provided very simple and handy implements for this purpose.

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HYDRAULIC MACHINERY.

[Condensed from Engineering].

A recent inspection of the varied productions of a Birmingham firm has led us to select a few applications of hydraulic machinery for illustration, possessing as they do the merits of novelty and utility. Fig. 1 in our engraving illustrates an hydraulic pulling jack. This jack consists of a cylinder, A, which is made of various lengths to suit the required lift. A piston, B, is attached to the tube, C, which slides in the cylinder, A, through a stuffing box at the end. Screwed on to the cylinder is a cistern, D, containing the pump, E, which is actuated by the hand lever. G is a small tube attached to the pump sliding through a stuffing box in the piston, B, and extending the whole length of the tube, C. The stop valve, H, closes the communication between the pump and cylinder. I I are two small passages from the tube, C, to the cylinder, A, while two other passages, K K, connect the cistern with the cylinder at the back of the piston, B. Water is poured in through the air screw in the cistern, and, after it is full, the jack is suspended with the cistern end downwards and the stop valve screwed up. On working the hand lever the water will be pumped from the cistern through the inner tube, G, and will pass through the passages, I I, into the cylinder and force the piston, B, to the bottom of the cylinder. The water at the back of the piston returns at the same time to the cistern through the passages, K K. By unscrewing the stop valve the water will return through the passages, I I, and the tube, G, to the cistern, and the weight will thereby be lowered. This jack was originally designed for the purpose of pulling up large tree stumps when clearing forests, or estates, of timber. It will be found useful in the shop, on board steamships, or, in fact, wherever heavy weights have to be dealt with. It will either pull horizontally or vertically, and the pump being arranged inside there is no possibility of derangement either from accident or rough usage.

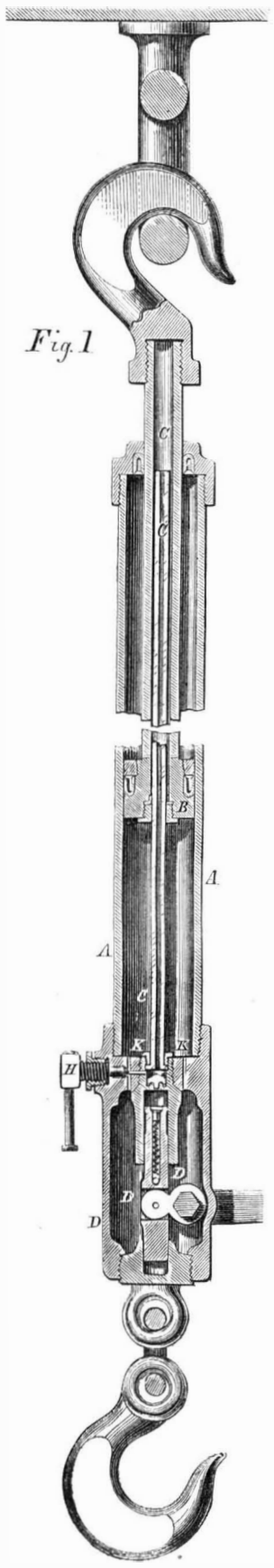

Fig. 1

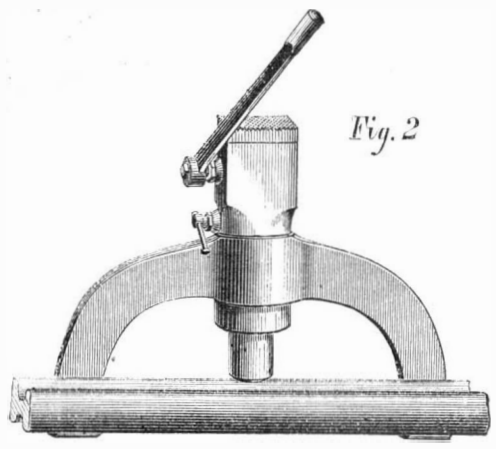
Fig. 2

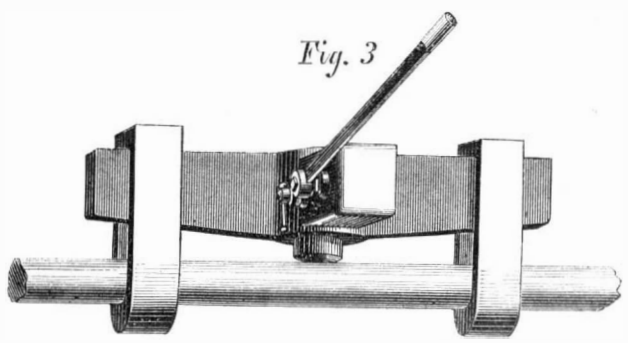
Fig. 3

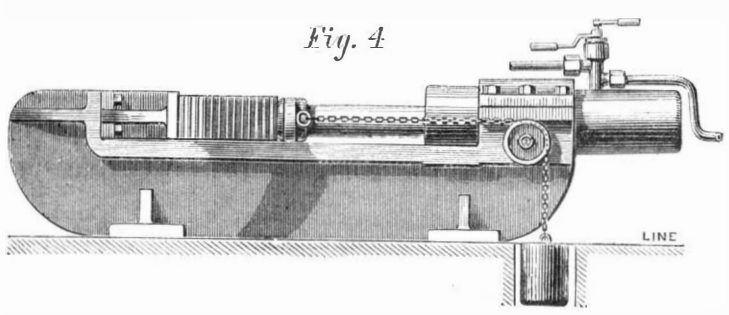

Fig. 4

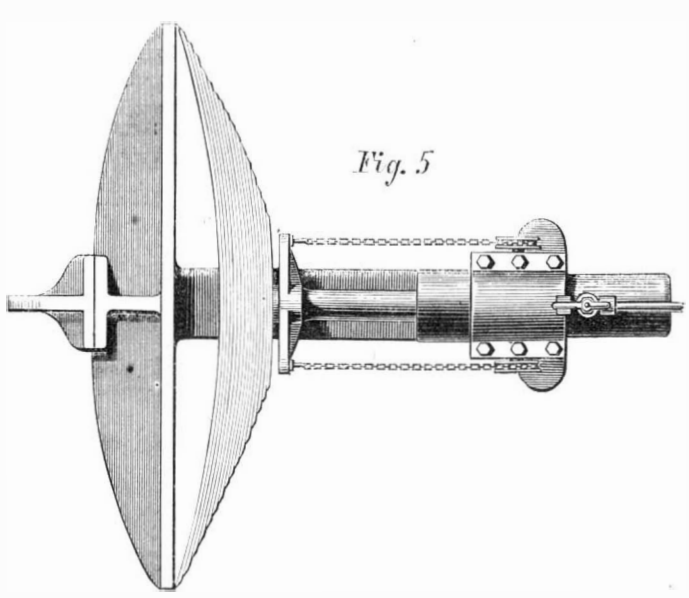
Fig. 5

Figs. 2 and 3 represent two more useful little hydraulic machines, the former being a rail bender or "Jim Crow," and the latter a shaft straightener. The hydraulic "Jim Crow" is a useful tool for platelayers; it is more easily applied, and has a great advantage over the screw crow, which takes a long time to screw up. On main lines where the traffic is great, and the thread of the screw becomes worn, it is often troublesome to get off, and involves the risk of a train passing over it. On the other hand, the hydraulic crow can be unshipped instantly. These crows are in constant use on the Great Northern Railway, and Mr. Budge, the assistant locomotive superintendent, reports favorably of them. They are there found very effective in breaking steel rails of the heaviest section. By merely nicking the rails with a chisel, they are broken off quite true, and a great amount of time and labor is saved. We should add that the jack swivels round in the frame, so that it can be worked in any position. The shaft straightener is for straightening shafting in the lathe, and is also in successful use. It is placed on the saddle of the lathe, and the shaft is passed through the straps, as shown in our engraving. The shaft is then centered, and the ram brought to bear on any part that requires to be straightened. Any irregularity can thus be far more quickly detected and adjusted than when the work is done on an anvil. The machine is lifted on and off the lathe by means of a bar which passes through an eye on each side of the straps.

At Figs. 4 and 5 we show respectively a side view and a plan of an hydraulic spring tester, which is adapted for testing the springs of locomotives, railway carriages, and wagons, etc., up to a length of 6 feet. It comprises within a very small compass a tester with hydraulic cylinder, ram, and balance weights. It has diagonal power pumps in the cistern, and is fitted with pressure gage, cast-iron air accumulator, stop and release valves, and a hand pump for charging the accumulator with air. In operating with this machine the accumulator is first charged with air at a pressure of about 300 lbs. per square inch. The power pumps are then started, and water is pumped into the accumulator until the requisite pressure is attained, which is indicated by the rising of a safety valve. Upon the stop valve being opened the accumulated pressure acts at once on the ram and compresses the spring.

To kill flies, soak quassia in sugared water. Paper saturated with this will attract and poison flies.

A Moon Fallacy Exposed.

A writer in the *American Builder* has taken the trouble to refute at length a large number of popular fallacies regarding the influence of the moon upon terrestrial things. We extract the following upon the cutting of timber and the sowing of seeds:

"An opinion is entertained that timber should be felled only during the decline of the moon; for if it be cut down during its increase it will not be of good or durable quality. This impression prevails in various countries. But can there be imagined, in the whole range of natural science, a physical relation more extraordinary and unaccountable than this supposed correspondence between the movement of the sap and the phases of the moon? Certainly, theory affords not the slightest countenance to such a supposition. But let us inquire as to the fact whether it be really the case that the quality of the timber depends upon the state of the moon at the time it is felled. M. Dechamel, a celebrated French agriculturist, felled a great many trees of the same age, growing in the same soil, and exposed to the same aspect, and never found any difference in the quality of the timber when he compared those which were felled in the decline of the moon with those which were felled during its increase; in general, they have afforded timber of the same quality.

"It is a maxim among gardeners that cabbages and lettuce which are desired to shoot forth early, flowers which are to be double, trees which are desired to produce early ripe fruit, should be severally sown, planted, and pruned during the increase of the moon; and that, also, trees which are expected to grow with vigor should be sown, planted, grafted, and pruned, during the increase of the moon. These opinions are altogether erroneous. The increase or decrease of the moon has no appreciable influence on vegetation, and the experiments of several eminent agriculturists have clearly proved this. Pliny states that if we would collect grain for the purpose of immediate sale we should do so at the full of the moon, because during the moon's increase the grain augments remarkably in magnitude; but if we would collect the grain to preserve, we should choose the new moon. So far as it is consistent with observations that more rain falls during the increase of the moon than during its decline, there may be some reason for this maxim; but Pliny can scarcely have credit for grounds so rational; besides which, the difference in the quantity of rain which falls during the two periods is so insignificant as to be totally incapable of producing the effects adverted to."

Rust Joints.

There are various recipes for the treatment of cast-iron borings, of which a so-called "Rust Joint" is to be made. In all such operations simplicity is to be commended for many reasons. First prepare the joint by bringing the inner joint rings of the flanges together—screwing up the bolts firmly—in this condition there should be an annular space between the flanges of from one quarter of an in. to three eighths of an inch in width, a strand of rope yarn or any soft fiber should now be stuffed to the bottom of the joint, so as to prevent the jointing material from being driven through in the process of calking. A good hammer, a calking iron rather thinner than the joint, and a flat piece of wood or sheet-iron should be in readiness. Now take a suitable quantity of fine cast-iron borings, free from dust, and which may be passed through a sieve to remove large pieces; next dissolve a very small piece of sal ammoniac (chloride of ammonium) in water; say a drachm to a quart (in the absence of sal ammoniac to mix up the borings with, the urine of any animal does quite as well). Now mix upon a flat board, or in a pot or pan, the borings, with sufficient of the fluid to cause them to adhere together in lumps when compressed in the hand. It is now ready for use. By means of the calking iron, and the piece of board or plate, stuff the moist material into the joint to a depth of 1 inch or so from the bottom, all round; now calk it down with the iron and hammer until it sounds perfectly solid, as though it struck against solid iron (this is the most important of all). Now again repeat the process of filling, then the calking, and so on, until the joint is filled to the very surface. It requires a considerable time, and the most careful hammering, to make a perfect joint, as, if there is the slightest trace of softness, steam is sure to escape, and gradually increase the leak. The joint should rest for at least twelve hours before being put under pressure. It will be observed that immediately after mixing the borings with the saline fluid it becomes quite hot, showing that powerful chemical action has been set up, the fact being that the immense surface of the innumerable particles of iron already in contact with the atmosphere, at once, through the presence of the moisture and the destruction of the balance by the presence of an unstable salt, begins to absorb the oxygen of the air. Now it must be observed that as the oxide of iron is being formed, it is held in solution by the still undecomposed chloride of ammonium, which accounts for the mixture remaining black for a time. This is useful in so far that it gives time for the operator to complete his joint before the solid oxide is really deposited. At this particular stage, were steam or water turned upon the joint under pressure, it is clear that the solution of iron oxide would all be washed out and leave the clean borings all but useless; but when time is given for the complete decomposition of the ammonia chloride, and the gradual evaporation of the component gases, the oxide is, as it were, precipitated, and forms a solid cement between the particles of iron. Rust joints very often prove a failure through a neglect of principles. It is evident that an overdose of sal ammoniac, a very common error, must be a source of failure—that the rust cannot form during the presence of the free salt.

A humane way of killing insects for preservation is to drop them into a jar of carbonic acid gas. This does not injure their colors in any way, but kills them quickly. The gas will be easily retained in a stoppered bottle, and is very easy to make. The action of sulphuric acid upon marble dust, or carbonate of soda generates it rapidly. Insects thus killed can be kept perfectly in the gas till they are put in the cabinet.

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To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums in the country.

THE MANUFACTURE OF ILLUMINATING GAS.

There have been very few changes in the manufacture of illuminating gas since the time that Westminster bridge and Pall Mall were lighted by it about sixty years ago, or since the organization of the New York Gas Light Company, within the memory of many men now living in our city. The original drawings of retorts, scrubbers, and purifiers, as given in the old work of Accum and Aiken, could be made to serve as guides to the constructing engineers of the present day. But the real progress has been in the grand discoveries of the uses to which the incidental products of the distillation of coal are capable. Our chemists appear to have overlooked the direct product, the illuminating gas itself, and to have devoted all of their energies to a study of the properties and uses of coal tar.

This state of things is now fast changing, and, recently, important progress has been made in the manufacture of illuminating gas, so that it is probable that the crude and unscientific method of distilling coal handed down to us by those who first undertook the manufacture, will be entirely dispensed with, and bituminous coal will be distilled for benzole, anthracene, paraffine, and oil, but not for gas.

Nearly one half of ordinary illuminating gas is composed of hydrogen, which, as is well known, burns without any illuminating power whatever. It is also known, that perfectly pure hydrogen can be prepared by passing illuminating gas over lime heated to cherry redness, the dry residue being carbonate of lime. From recent researches, it would appear that a somewhat similar decomposition of the hydrocarbon generated by the distillation of coal takes place in the retorts, carbonic acid, carbonic oxide, and pure carbon, in the form of gas carbon, and coke resulting.

What the gas company wants is, not hydrogen, but a suitable compound of that gas with carbon; but, in spite of all the precautions of the engineers, half of the product of the manufacture is hydrogen. Since the discovery of this fact, attention has been directed to cheaper methods for the preparation of hydrogen, and the subsequent carbonization of that gas in an economical way, thus securing a gas entirely composed of hydrocarbons of great illuminating power. This carbonization can be accomplished in various ways, and we may recur to some of them subsequently.

The method for the manufacture of pure hydrogen that appears to be the most practical, at the present time, is the one proposed by M. Tessie du Motay, and consists in heating a mixture of damp coals and hydrates of the alkalies. A mixture of hydrogen and carbonic acid is thus generated, which can be freed from the latter gas by being passed over other alkalies, which, being thus converted into bicarbonates, can be sold as such, or can be used as sources of pure carbonic acid now extensively required in the arts. The alkalies originally employed can be regenerated, to a considerable extent, and used over again. The hydrogen comes from the water of hydration of the alkalies, and from the moist coal, and the carbon serves as a reducing agent, to give us a pure gas. It is said that hydrogen is more economically made in this way than in any other. The cost of carbonizing it by passing it through benzole, or by synthetical methods, is trifling, and, in theory, at least, we here have a simple and cheap method for the manufacture of illuminating gas, without the necessity of vast retort houses, exhausters, purifiers, condensers, and incidental products of the ancient distillation process. In connection with this method of making hydrogen, and converting it into hydrocarbon, we have the proposition to add oxygen at the point of combustion, but this proposition brings up other questions that it is not necessary for us to discuss in this article.

Since the introduction of petroleum into commerce, attention has been naturally turned to it, and to its products, as a probable cheap source for illuminating gas. Various patents have been taken out, and a number of hotels and small towns in the country are using gas manufactured under one or another of them.

When petroleum is distilled, one of the first products that goes over is a highly explosive and volatile compound called naphtha. It would be entirely a waste product, were it not for the fatal and highly reprehensible habit, on the part of some dealers to adulterate and increase the volume of kerosene by its use. In naphtha we have an admirable material for the cheap production of illuminating gas. To prevent danger from fire, the naphtha is converted into a vapor by steam, and it is afterwards superheated and then passed into retorts, where it becomes a fixed gas. It is then conducted into suitable gas holders. As it is free from sulphur, carbonic acid, carbonic oxide, and other impurities, the necessity for purifiers, and other expensive machinery is dispensed with. The gas prepared in this way is free from the volatile and condensable products of the distillation of coal, and hence, is not affected by cold weather, and is not liable to clog the pipes. The manufacture can be conducted very nearly automatically, so that very little labor will be found to be necessary. The heat required is small, and the yield of gas very large for each retort. When tar, dead oil, and other hydrocarbon liquids are used, greater heat and more complicated machinery are necessary; and such material is itself often the product of the distillation of coal, and therefore does not enable us to dispense with the old methods of making gas.

The progress of science, during the last ten years, also points to the probability of our making illuminating gas synthetically But such a realization is too distant for us to do more than allude to it as within the range of possibility. What we particularly need, is an invention that will enable us to dispense with the present crude way of making gas, which creates a nuisance in the city and affords an article of very inferior illuminating power.

It would not appear to be a difficult matter to accomplish this result, and, as we have pointed out in our article, there are a number of methods that have such elements of success in them, that they ought to be thoroughly tested before being abandoned as worthless. But whatever is done, we hope that the streets of our city are not to be dug up for the laying down of pipes, and to give certain people jobs, before the proposed improvement in gas has been fully tested. We have witnessed enough pipe-laying in our day, and have suffered sufficiently from expenditures of gas to be willing to wait until the proposed change is certain to be an improvement, before asking to have it tried.

COATING VESSELS WITH ZINC.

The protection of iron ships by the application of zinc, or, in other words, the galvanizing of their surfaces, has attracted considerable attention. The process of "galvanizing," as it is called, that is, the coating of iron with zinc, is ordinarily performed by dipping the piece to be galvanized into melted zinc, the piece being previously cleansed from oxide and dirt, and the surface of the melted zinc being covered with sal ammoniac.

Taking this brief description of the process as a starting point, it seems a bold proposition to galvanize a large iron vessel. Yet this is just what is proposed by Mr. Charles Lamport, who, in an address before the Institution of Naval Architects, at London, at a recent session, gave the details of his plan.

Before we notice these details, however, it will be necessary to notice the difficulties which render them needful.

The first of these is the removal of the peculiar skin, or scale, which is met with on all iron plates, as they come from the rolls, and which prevents the adhesion of the zinc. It is also necessary that the plates should be brought to a temperature nearly equal to that of the melted zinc.

It seems, that of late, on the European continent, a method of pouring the zinc over the plates, instead of immersing them, has been rendered possible and successful, by the use of a flux, the nature of which is not given in the address of Mr. Lamport—a very important omission indeed, as he seems to rely upon its use in the application of his method, which is as follows:

Over the sides of the ship he will suspend a bath with so much of a furnace attached as will maintain the zinc in a fluid state. This bath being in contact with the side of the ship, the plate against which it is placed will become of a temperature, he thinks, sufficient to allow of adhesion, if the scale be taken off.

To remove the scale, as well as to perform the other parts of the operation, he proposes to use what he styles molds, one of which will be made of a steel plate one fourth of an inch in thickness, rolled cold, and having a very fine skin put upon it, so as to prevent the adhesion of the zinc to it. Around the edges of this plate will be found a thin edging of metal of the thickness of zinc plate desired to be cast on the side of the ship. Preparatory to the application of this mold, the scale is to be removed by the use of a wooden mold, coated with some substance that will resist the action of sulphuric acid. Between this mold and the side of the vessel the acid is to be introduced and allowed to remain long enough to remove the scale. The flux is to be applied in a similar manner, after which the melting furnace and steel mold, above described, are to be applied, provision being made for its exact accordance with the space previously acted upon by the acid and flux. The melted zinc is then to be poured into this mold and allowed to run through until such time as the iron is heated to the proper temperature for adhesion, when the flow will be stopped and the plate will become permanently attached to the metal. At least, that is the opinion of the inventor of the method. Whether he is right or not will appear from the practical experiments he intends to perform during the ensuing year.

Provision for buckling is to be made by allowing portions of the zinc to remain unattached to the iron, a matter regulated, of course by the non-removal of the scale, except of such parts as are desired to unite with the zinc.

Of course it would be unwise to hazard any positive prediction as to the ultimate success or failure of this method, in anticipation of its practical trial. We cannot fail to see, however, numerous practical difficulties, which will heavily tax the genius of Mr. Lamport to overcome. We shall keep watch of any reports of experiments made in this direction, and, if important results are attained, will lay them before our readers in due time.

THE NEW PATENT LAWS---IMPORTANT CHANGES AFFECTING AMERICAN AND FOREIGN MANUFACTURERS---FREE TRADE IN PATENTS NOW FULLY ESTABLISHED.

The advocates of the free trade system, if they did not succeed at the late session of Congress in realizing all their aims, certainly made a clean sweep so far as patents are concerned.

This country is now thrown freely open to all foreigners in respect to patents, and the peoples of all countries may come or send here and compete with American genius and industry on the most favorable terms.

The law which required foreigners to put and continue their inventions on sale in this country, within eighteen months after obtaining their patents, has been repealed, and foreigners, like our citizens, may choose their own time for working their patents.

Another provision of the new law permits a foreigner to patent his invention here at any time, ever after it has been introduced and patented abroad for years, provided it has not been used here for more than two years prior to application for an American patent.

The old law prohibited the grant of a patent for any foreign invention that had been brought into use here, even for a day, prior to application for a patent.

In the same way the new law also throws open to foreigners the right to take out patents for designs, and as this virtually includes all the new figures and pattern for every description of fibrous and textile goods, such as carpets, silks, laces, calicoes, trimmings, etc., the law becomes important to our home manufacturers.

The following is the provision of the new statute in relation to design patterns:

"Any person who, by his own industry, genius, efforts, and expense, has invented or produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture, to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, and patented or described in any printed publication, may, upon payment of the duty required by law, and other due proceedings had the same as in cases of inventions or discoveries, obtain a patent therefor."

The Government fee for a design patent is $10 for 3½ years, $15 for 7 years, and $30 for 14 years, with privileges for extension.

Another novel provision of the new law consists in the registration of trade-marks. When a patent has been granted for the article or the pattern, a further security may be obtained in the shape of a patent upon the trade-mark that is placed upon the article or goods. The following is the law for trade marks:

"Any person or firm domiciled in the United States, and any corporation created by the authority of the United States, or of any state or territory thereof, and any person, firm, or corporation resident of or located in any foreign country which by treaty or convention affords similar privileges to citizens of the United States, and who are entitled to the exclusive use of any lawful trade-mark, or who intend to adopt and use any trade-mark for exclusive use within the United States, may obtain protection for such lawful trade-mark, by complying with the following requirements, to wit:"

The Government fee for registration of a trade-mark is $25. Duration 30 years, with privilege of renewal.

One effect of the above new laws will be to put an end to that extensive class of American industries which has grown up and flourished by the manufacture of articles and goods copied from foreign sources. All who undertake such reproductions without consent of the foreign originator, will be liable to be interfered with at any time, by the grant of a patent, and the stoppage of their works.

Another effect of these laws will be to compel our citizens to invent their own designs, and thereby artistic invention on our own soil will perhaps be encouraged.

We have in preparation, to be issued in a few days, a new

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edition of our widely-known instruction book. It will contain the new patent laws, with full directions for those who wish to avail themselves of its benefits. We shall be happy to forward copies of this book *gratis* to all who will send us their names with the stamps to pay the postage—four cents.

Meantime, Messrs. Munn & Co. would inform their friends in all parts of the world, that they are in readiness to take out patents for inventions, designs, and trade-marks, under the new laws, with promptness, and on moderate terms.

Address Munn & Co., 37 Park Row, SCIENTIFIC AMERICAN Office, New York.

HOW MERCURIAL THERMOMETERS ARE MADE.

The word thermometer,as everybody knows,of course,means "heat measurer," and yet the word, in its etymological signification, conveys what is, or, at least, may be, an erroneous notion of the actual results obtained by means of this useful and interesting little instrument. That heat should be accurately measured, implies that we should be able to start from zero, or no heat. The zero upon our ordinary Fahrenheit thermometers is only thirty-two degrees below the freezing point of water, and this temperature,as is demonstrated by the use of instruments capable of indicating a relatively very low degree,is still as evidently heat,and a good deal of heat,though not so much as that of our scorching July days. We have no more authority for saying that the lowest degree registered closely approaches the lowest, in the nature of things possible, than we have for asserting, that the highest degree attained or measured is the highest degree possible. All that the thermometer does, is, assuming that the cause is proportional to the effect, to indicate by a regularly adjusted scale, the expansion and contraction of a certain substance—for instance, alcohol or mercury—and from this expansion and contraction, we infer that the cause or condition of it—that is,the increase or decrease of heat is proportional to the result. It would not be erroneous to say, that the thermometer measures the relative increase or decrease of temperature, but it does not, and can not, measure heat itself. Yet the uses of the instrument are as various and beneficial as if heat were as absolutely measured, as we can measure the pressure of the air by the barometer, or the specific gravities of liquids by means of the hydrometer. All results,dependent exclusively upon heat, will be uniform, for the same degree of heat, and, using this law, we can reason from one result to another, the results, of course, having been first obtained by experiment, and registered for use.

As an illustration, having once discovered and noted the fact, that water boils in the open air when the mercury of a thermometer, immersed in it, has expanded to the point of 212° on the scale, we may always count on the concomitance of these results, the boiling of water, and the registered expansion of the mercury, except under the following circumstances, which, so far as we know, have yet received no explanation. After a thermometer has been exposed for some weeks to the ordinary temperature of the air, if it be suddenly exposed to the temperature of boiling water, its freezing point will often be found to have lowered from one to two degrees. This has been observed in some of the standard thermometers of the Royal Society, London, and by various experimenters. It is sometimes two or three weeks before the freezing point corresponds again with that on the scale.

The determination of the temperature at which different physical results take place is of incalculable advantage to science and the arts, notwithstanding what has already been said, that the thermometer really does not measure heat at all.

It is not intended to discuss here, however, either the history, theory, or uses of the thermometer. Our object is to describe the manufacture of the instrument, the indications of which have so much to do with our physical comfort or discomfort, and which are so important to nearly all processes in the arts.

A mercurial thermometer is a very simple instrument. A small glass tube, with a bulb at one end, containing mercury, and a graduated scale, constitute all that is essential to it, yet in this, as in many other cases, simplicity begets difficulty. To make this simple combination perform its duty accurately, is by no means an easy matter. The first difficulty met with, is the want of uniformity in the diameters of the bores of different tubes,and the varying size of the bore in almost every tube. It is scarcely possible ever to find one the caliber of which is the same throughout its length, and,if so found,it is the result of pure accident. It is obvious, therefore, that unless some means of eliminating the errors which would arise from this source, be adopted, nothing like accuracy can be expected in the indications of the instrument. As the character of the bore cannot be altered, the desired result must be obtained in another way.

The method employed to obviate this difficulty is called "calibration." Tubes are selected tolerably free from imperfections,and a column of mercury,of one inch or less in length is introduced into it. The tube is then attached to the frame of a dividing engine, and put in connection with flexible rubber bags, to which pressure is applied, and regulated by screws. The air pressure in one bag being reduced, while it is increased in the other, the mercury column may be forced to and held at any part of the tube.

The mercury being thus brought to the portion of the tube where the graduation is proposed to commence,the exact position of one end of the column is marked upon the tube, a microscope with cross wires being employed to aid the eye of the operator in performing the operation with exactness. By means of the rubber bags, the mercury is again forced along until the end of the column, where the first mark is made, is brought under the microscope cross wires, placed at the other end, and so on throughout the entire length intended to be graduated. The varying lengths of the column which are accurately measured in the different positions are recorded,and indicate the variations in the caliber of the tubes. A permanent mark is made at the end, as at the beginning of the calibration.

It will be seen, that if the spaces successively occupied by the mercury be divided into an equal number of equal parts, any one of these parts will indicate a corresponding increase of volume, although the bore of the tube may vary in its diameter.

The required dimensions of the bulb are found, aproximately, by weighing a measured length of the mercurial column, and computing the capacity of the bulb from the known expansion of mercury and its specific gravity.

The bulb may be formed upon the tube previous to the calibration, or afterwards attached. In the former case, however, the thermometers have their scale divided after the determination of the freezing and boiling points, and no tubes can be used except such as are found to be approximately perfect. In the latter case, the arbitrary scale, as marked from the calibration, may be reduced after the determination of the freezing and boiling points into the Fahrenheit scale, by the application of a simple algebraic formula.

The freezing point is determined by placing the bulb in finely pounded ice, from which the water is drained away as it melts. The boiling point is obtained by placing the bulb in steam having the same elasticity as the atmosphere, a peculiar apparatus, devised by Regnault, being generally employed for the purpose.

In putting in the mercury, a small reservoir of paper or glass is fixed upon the upper end of the tube. Heat is then applied to the bulb, which, driving out the air through the mercury, the latter, as soon as the bulb is allowed to cool, descends through the tube, being forced by the pressure of the external atmosphere. The upper end of the tube is then heated and drawn out, ready to be sealed hermetically. The mercury is then boiled in the bulb, to expel all trace of air, and, while it is in a state of ebullition, the tube is sealed by directing the flame of a blowpipe against the upper end,which fuses the glass and closes the aperture.

The reader must not imagine that all the manipulations we have described are performed on all thermometers in a perfect and accurate manner. A very large majority of these instruments, in common use, are entirely worthless for any scientific investigation, although they furnish, perhaps, sufficiently accurate indications for the regulation of the temperature of apartments, and for other ordinary purposes.

IS THE KNOWLEDGE OF ENGLISH GRAMMAR NECESSARY TO THE WRITING OF GOOD ENGLISH?

A correspondent writes us that the practical working men of this country need a practical grammar in order to enable them to attain that facility and accuracy of expression, essential to a lucid communication of their ideas. The present works upon the subject, he thinks, are overburdened with rules, observations, and quotations, and are not adapted to the use of such as wish to learn to write and speak correctly in the shortest possible time, and without the aid of a living teacher.

As this bugbear of grammar is, we know, preventing many valuable ideas and suggestions from receiving the publicity they deserve, we propose to devote a brief space to its demolition.

First, then, we say that the use of correct and forcible language, either in writing or speaking, is purely a matter of habit. No one in writing can afford to stop and apply grammatical rules to every word and phrase he employs, and no writer does this. If he had these rules all at his tongue's end, they would not enable him to use good language, unless good language is the daily habit of his life. Many of these rules are of extremely doubtful character, so far as the English language is concerned, and more are so loaded down with exceptions that they are practically useful only to critics in defining and pointing out errors of style and construction in such literary productions as depend for their merit more upon their style than anything else. The use of good language cannot be put on and off like a coat. He who accustoms himself to loose forms of expression to-day will to-morrow speak loosely when he perhaps desires to be accurate.

Many of our most able writers and speakers know little or nothing of grammar as a science, and one of the most forcible writers among the contributors to our present magazine literature has recently written a series of articles for the *Galaxy*, in which he has sought to prove that most of the definitions and so-called rules of English grammar are shams; even going so far as to entitle one of his articles "The Grammarless Tongue," meaning by the expression, grammarless tongue, our vernacular. It must be confessed, too, that he made out a pretty strong case.

If, then, the use of good English is not to be learned from "English grammars," how is it to be learned? We answer, by familiarizing ourselves with good language, by studying the meaning and derivation of words, by the habitual reading of such authors as are accepted authorities in the use of language, and whose writings have established its usage. This will not avail, however, if an attempt is not made to shake off bad habits, and acquire good ones.

But it is not necessary to possess the most happy style of expression to communicate important facts. An old professor used to remark that most people of moderate education can write and speak forcibly if they *have something to say*, meaning that they must possess some complete idea, well thought out, before they attempt to utter it. A man having an idea thus mentally wrought out, may misplace capitals and misspell words, but he can scarcely fail to make himself understood; for his thinking has been done in language, and the natural expression of the idea must be nearly or quite as clear as his thinking. But if he try to assume an artificial style quite foreign to that which he is accustomed to use, ten to one he will fail to make himself understood.

We trust no correspondent or reader will hesitate to communicate anything he deems of value to us for fear of making grammatical or orthographical errors. Let the aim be merely to express the ideas clearly, and we will be responsible for all the rest.

DEPRECIATION OF AMERICAN VITALITY.

Dear reader, during this terribly exhausting devitalizing weather, we have steadily kept to a pre-adopted resolution that we would leave the discussion of the "heated term" entirely to the dailies and health journals; and, although the above heading might at first sight lead to the belief that our stock of subjects is so far exhausted that we are compelled to resort to a rehearsal of the oft-repeated platitudes which annually appear at this season, about the heat, and the dust, and the way to avoid sun-stroke, and how to keep cool, and how to get a good sleep in hot weather, etc., etc.; we assure you that we have something more weighty to discuss.

We Americans are charged with a "decrease in vitality;" not at this particular season, but in general. We plead "not guilty to the charge."

What is the evidence of our decreasing vitality? The report of a life insurance company, which shows that out of forty-four deaths occurring during the past year among its insured, eighteen had been insured only three years.

This a cotemporary takes as ample evidence of the decrease of "American vitality," and gives us a column-and-a-half homily upon our sins of omission and commission, which in its opinion are fast bringing the nation into a state of physical degradation.

In defense of our plea, we call attention to the following facts. First, that the present competition among life insurance companies, and the methods in which many of them transact business, are such that we wonder the proportion of deaths occurring among their insured is not greater than it is. Second, the fact that we, as a people, bear and endure more than formerly, is an evidence of increasing rather than decreasing vitality.

Only consider for a moment the burdens of dress which our increasing civilization imposes. Think of the bunion-breeding boots, the chest-compressing corsets, the fashionable, black silk, headachy hats for males, and the almost entire absence of hat for females. Think of the horrible heaps of hair bundled upon the heads of our women, and the merciless exposure of the necks and legs of American children.

Think of the indiscriminate way in which we bolt our food at all hours, and how that food is adulterated, and how abominably it is cooked. Think of the gallons of tepid enervating drinks we swallow, and the annual consumption of alcohol and tobacco.

Think of the system of tasking and cramming from books, which we call education, and how our daughters graduating at eighteen from seminaries of learning, are expected to have mastered, or done their best to master, all the dead and living languages, the sciences, literature, and metaphysics.

Think of what frightful drafts upon the hours of natural rest are made by the balls, routs, and parties of fashionable society.

Think of how our young men plunge either up to the neck in dissipation, or rush without stint into business in the mad race for riches.

Think of how all this rush and bustle, this highly seasoned mental and bodily food feeds the passions, and begets a craving for the excitement which in turn, instead of satisfying, feeds the craving.

Think of our swift journeys by land and sea. Think how the telegraph brings all countries near, and how events, the news of which thirty years since would have scarce reached us in months, are now retailed by the news mongers next morning before we get down to breakfast, demanding increased activity of brain, and keeping the mind constantly at work.

It is safe to say that an average American of to-day lives more in one year than he could have done in ten, a half century ago.

And yet he stands it pretty well. To be sure, his nerves are rather sensitive, and he finds it hard to sit still. You will nearly always see him dancing his cane, or drumming on the table, twitching his legs, whistling, or humming a tune. But even these additional drafts upon his vitality are honored by his constitution in a way that shows that although he may, and often does overdraw the account, that account must be a large one at the outset of his career.

No! American lives may be shorter than formerly, although we think there is not good evidence of even this; but vitality must be on the increase, or the drains made upon it would make us all bankrupt.

We rest our case. What say you, gentlemen of the jury?

SCIENTIFIC INTELLIGENCE.

CURE FOR LEAD POISONING.

In some of the large establishments of France the best antidote for lead poisoning was found to be a lemonade made of weak sulphuric acid, but after a while the workmen became disgusted with the taste of this liquor, and refused to drink it. It was observed that two workmen in one of the factories were entirely exempt from lead colic, and, upon inquiry, it transpired that they made free use of milk. The director of

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the works at once ordered enough milk every morning and evening for all of the workmen,and from that time all symptoms of lead poisoning disappeared. The suggestion is worthy of attention on the part of all persons who are exposed to the poisonous action of lead, to make free use of milk. It is at once an agreeable and easily attainable remedy.

USE OF ELECTRICITY IN CAUTERIZATION.

The old method of cauterization by fire is to be replaced by the electro-thermic or galvano-caustic apparatus. The latter process is safer and more certain in its operation. It is possible at will to vary the degree of heat, to raise it instantly to the highest intensity, to diminish or suppress it, to render it intermittent or continued, to direct it into deep cavities, and to destroy all the tissues by contact. It is said that the wounds produced by electricity are less liable to contagion and miasmatic infections than those caused by sharp instruments.

The apparatus can be made of any desired shape so as to be applicable to all parts of the body, and it is known that important cures have been effected by the introduction of platinum wires and the cauterization by the battery of parts of the body inaccessible in any other way. Electricity has already been tried in cases of bad tumors, in amputations, in excisions of cancers, in destruction of wens, for opening cysts, for removing internal tumors, upon wounds by fire, and in numerous other cases. And a recent article in *Cosmos* claims for it the following advantages: The electro-thermic cautery suppresses all pain after the operation; avoids loss of blood; prevents the retention and alteration of the liquids; avoids all putrid and purulent infections; facilitates the organic reconstruction and healing of the parts; affords a method universally applicable, strong or weak, continuous or intermittent; capable of sloughing the tissues, of carbonizing them, of destroying them, of converting them into gas, and must be regarded as one of the most important contributions to modern surgery."

PRESERVED BREAD.

This bread is proposed as a substitute for the biscuit and "hard tack" used at sea. It is easily prepared though the process is somewhat tedious. The bread is baked in the usual way, it is then subjected to desiccation for eight to fourteen days, until it is thoroughly dry; it is then exposed for a short time to the action of steam, and afterwards squeezed into tablets under an hydraulic press for twenty-four hours. The tablets can be preserved for years in hermetically-sealed packages.

Bread thus prepared retains a vitreous fracture, can be easily masticated by the teeth, is admirable for bouillon and soup, and experience has shown that 200 pounds of good flour will afford 188 pounds of compressed tablets. An army provided with this bread and Liebig's extract of meat would be prepared for any emergency that might arise. A soldier could easily carry several days' rations in his knapsack.

DISINFECTING SOLUTION.

According to *Cosmos* the medical authorities of Paris ordain phenic (carbolic) acid for the disinfecting of the bodies of patients who have died of small-pox. For this purpose they taks 12 grammes of crystallized phenic acid to one liter of water. Hitherto chloride of calcium has been employed, but never with satisfactory results, whereas phenic acid has been found to be entirely effective, and its application is unattended with inconveniences of any sort.

CURE OF CONSTIPATION BY ELECTRICTY.

Dr. A. Cabe, of Lyons, France, had in his practice a very obstinate case of constipation in a female subject 80 years of age, who for sixty years had suffered in consequence of a severe attack of dysentery encountered in her youth. The patient having had no passage for forty days, the doctor tried to induce a contraction of the intestines by the application of electricity. He inserted the negative pole of a Gaiffe battery into the rectum, and applied the positive to the navel, and in the course of two minutes the results were completely satisfactory.

SOLUBILITY OF CLAY IN WATER.

M. Schloessing has shown that clay is soluble in distilled water. There appears to be a colloidal solution that will remain for months, but if a drop of chloride of lime be introduced the liquid becomes instantly clear. The water of the Mississippi always contains more or less alumina in suspension, which can be removed by adding a few drops of a solution of chloride of calcium, or of sulphate of lime. In this manner the Egyptians clarify the water of the Nile, which is always turbid.

A SPONTANEOUS COMBUSTIBLE GAS.

The bi-bromide of ethylene, when mixed with oxygen gas, takes fire spontaneously in the sunlight. The bromine appears to combine with the hydrogen in a manner analogous to the union of chlorine with hydrogen in the sunlight.

HOW OUR WHEAT CROPS ARE HANDLED.

The facts given in the following account of the mode of handling our grain crops at the west, from a Milwaukee correspondent of the New York *Tribune*, will convey to many of our readers at home, as well as abroad, some conception of the immensity of the grain business in this country:

The city of Milwaukee, with its 100,000 inhabitants, and Chicago, 3½ times larger, are what they are because they handle such vast amounts of the raw material of food. On an average, as Mr. Fisk remarked in his wonderful story of the gold panic, it takes one bushel of grain to bring the other to its market. When a farmer raises 200 bushels, the value of 100 is divided among railroads, elevators, schooners, and operators, who are thus paid for delivering the other 100 to the consumers. In this view the facilities for handling grain become as important as the art by which it is produced. In the descriptions that follow, the accounts of marvelous quantities and vast warehousing apparatus, the farmer will see how stupendous is the system to which he contributes, and warm-hearted Americans may see somewhat in all this to remind them of the marvelous resources and material grandeur of this nation.

As a general mart for the sale of all grains Chicago is quite in advance of this city and of all our cities; but for wheat as the special crop of the West, the grand cereal, Milwaukee is the place for learning how it is treated after it leaves the bins of the farmers. The reason why this place thus bears off the palm and gives law in the wheat market is simply because she has had several far-seeing and enterprising citizens who were duly impressed with the importance of drawing the crops for the great grain region north and west of here to this point for shipment to Eastern cities. The railroads built, Milwaukee has laid her hands on a lion's share of the wheat crops of the Northwest by certain business virtues and by prompt and liberal expenditures at the right time and place. In this respect her example is a pattern, and is profitable for young business places and young business men to study. For it is by no means a matter of course that Milwaukee should receive and ship twenty odd million bushels of wheat. This is not the only outlet. In fact, Chicago is reaching out for this same 20,000,000 bushels, and she would have drawn it had not Milwaukee made it for the interest of all shippers of spring wheat to send their trains here rather than to her vigorous, vigilant, daring, and imperial rival.

WHAT IS AN ELEVATOR?

An elevator, in these grain cities, means an enormous building usually more than 200 feet long and over 100 high, with an equipment of powerful belts and buckets for raising grain, and rows of gigantic bins for storing it. I have just returned from a visit to Elevator A, that stands at the termination of the La Crosse division of the Milwaukee and St. Paul Railroad. This structure is 280 feet long and 80 wide. The total length of the great driving belt, urged by a 200-horse power engine, is 280 feet, that is, the half extending from cellar to comb is 140 feet, and the down half is of course equal to it. This belt is thirty-six inches wide and three-quarters of an inch thick, and is made of six-ply or thicknesses of canvas, with sheets of india-rubber passed between and into them. But such immense strength will not seem excessive when we see the Titan work it has to do. It drives nine receiving elevators or belts set with buckets; each of these is as long as the main belt; that is to say, they lift the grain 140 feet. The buckets are made of thick tin bound with hoop iron, and are well riveted to the belt at intervals of fourteen inches. In shape they are like the buckets in a common grist mill, but very much larger, for these are six inches across the mouth and eighteen inches long. When full one contains a peck. They do not usually go up quite full, but, allowing for this, there are 100 pecks, twenty-five bushels, loaded on one side of one of these belts whenever it is at work. If all nine are running at once, as is often the case, the quantity of wheat lifted on these swift-running belts is 225 bushels. The established weight of a bushel of No. 2 Milwaukee Spring is fifty-five pounds. This would make the total lift of the receiving elevators, every moment they are at work, over 12,000 lbs. Discharging upon each of these nine is a hopper-shaped bin beneath the railroad track. A car load of wheat is rolled over the bin, the doors lifted, and six stout men step in with big, bright, grain shovels. Each knows his place, and they work like so many engines, with a stroke steady and true and effective. In four minutes from the time these six step into the car there is nothing left but a quart or two of sweepings on the floor. A car carries from 250 to 300 bushels, and the swift-running belt that rushes by them in its tireless industry has carried the 300 bushels 140 feet in the air, as fast as those six stout Teutons could shovel it out. I was pleased to note a manly and candid expression on the faces of all who were at work in wheat. They did not look like men who spent their earnings on bad whiskey or smoked them away over lager and pretzels, coming home late to pound a hard-working woman and curse their children.

When carried aloft the receiver throws the grain into a hopper-bottomed bin fixed on scales, and the weight is accurately given. Before the wheat is rolled into the warehouse it is carefully inspected and graded. Nineteen out of every twenty bushels coming here is spring wheat, and thirty-eight per cent of all that arrives this year is graded No. 2. The inspector gives his memorandum to the weigher, and he turns the spout over the bin containing No. 1, No. 2, or No. 3, as directed by the marks on the inspector's book. Very much depends on the care and honesty of this inspector, and the laws of the Milwaukee Chamber of Commerce require that he be sworn, that he give heavy bond, and be himself in no sense a buyer or a seller of wheat. Here let me remark wheat is often graded No. 2, not so much because it lacks plumpness and weight as because you let oats get in with it. And this neglect is rather on the increase. Farmers do not appear to be as particular as they were about their seed wheat. For instance, Mr. Langston, the secretary of the Board, showed me his tables, and from them it appears that in 1865 seventy-seven per cent of the wheat was No. 1. The next year we had that bad fall when it rained all August, and everybody's grain sprouted. There was but ten per cent of No. 1 in 1866. In 1867 it was sixty per cent. In 1868 and 1869 the harvest has been nothing to complain of, but Milwaukee saw but thirty-eight per cent of No. 1 wheat.

The bins in which this wheat is poured are of great size, being 60 feet deep, 20 wide, and 10 across, containing 12,000 cubic feet. The total receiving and storing capacity of this establishment is 1,500,000 bushels. Of the crop of 1869 it has received 7,000,000 bushels. About 10,000 bushels are taken into a train of the average length. So 2,100 trains have rolled into this elevator and discharged.

HOW WHEAT IS SHIPPED.

Milwaukee has an admirable harbor. Two rivers run into the lake, and at the junction is a wide spread of marsh grown up with bulrushes and green with aquatic rankness. But the mud is soft, and canals are easily cut, so that a hundred of these warehouses could be so stationed that while cars rolled up on one side, ships drawing ten feet of water might anchor on the other. As soon as a grain ship is anchored beside an elevator the hatches are removed, and great spouts extend over them from the bottom of one of the enormous bins I have described. The gate is raised and a torrent of wheat pours down. The loading power of these spouts is 12,000 bushels an hour. The *Orient*, for Oswego, was loaded the other day in an hour and a half, and her capacity is 18,000 bushels. The Oswego and Ogdensburg schooners and vessels destined for the Welland Canal usually take on from 12,000 to 20,000 bushels. The Buffalo vessels are larger, often receiving 30,000 and in a few cases 45,000 bushels.

It must not be supposed that one of these bins of wheat stands week after week without further care. It is the business of a good warehouseman to watch his wheat, and see that none of it is heating. If he thinks it needs air he can, by lifting a gate, throw it all in a cascade on the floor, and lift it back with the elevator.

Milwaukee has seven such elevators as I have described, but this is the largest. They vary in receiving capacity from 500,000 to 1,500,000 bushels. During the year past more than 14,000,000 bushels have been shipped to the lake cities. Of this Buffalo takes one half, Oswego the rise of 3,000,000 bushels, Kingston 1,500,000 bushels, and the rest goes in driblets to Erie, Cleveland, Toledo, and Dunkirk.

ACTIVITY IN WHEAT.

Napoleon's war, though it brings quaking and ashes to those Rhenish provinces which he proposes to conquer, adds millions and millions to the pockets of Northwestern farmers. The large dealers say they expected nothing but a decline; one large buyer, the largest in the Northwest, says he expected to see No. 2 Milwaukee Spring at ninety cents, and falling by this time. But by a curious coincidence wheat sells to-day at just the figure it held on the 18th July, 1869—that is, $1·30.

I see large crowds in the Chicago Board of Trade, a confused blending of shouts, men reeking with perspiration making swift entries in little books, and bantering each other and betting in words and figures which I do not wholly understand; and the telegraph wires are loaded with messages about wheat, ordering, countermanding, and again confirming the first order. The language in which the business is conducted is very much condensed, but it is easy to see that the fever in Europe brings tossing and tumult to us, but on the whole it benefits the farmer greatly. Milwaukee No. 2 often commands five and sometimes ten cents more than Chicago No. 2. That is, a farmer or a country merchant has a lot, and sends half to one city and half to the other; that which goes to Milwaukee will sell the best. Why? First, because the more northern wheat is generally better and plumper than that which grows in a hotter sun. Secondly, because the men who handle and inspect wheat in Milwaukee are more careful and honest, and those who have charge of the elevator do not let it heat. Thirdly, these circumstances have given Milwaukee wheat repute and a good position in market, and everywhere "a good name is better than rubies."

Boiler Incrustation.

Incrustation is injurious in three distinct ways: It increases the consumption of fuel, injures the boiler, and may even compromise its safety. Incrustation less than one eighth of an inch thick allows the passage of only one quarter of the heat it would if the plate were clean.

One way in which incrustation injures the boiler is by its requiring the fires to be forced, thereby furthering the oxidation, diminishing the strength, and tending to tear away the plates of the boiler. The very cleaning of the boiler tends to injure the plates and structure. At the same time, there is no doubt that a thin incrustation protects the surfaces of the plates against corrosion, and that it often closes up the joints and prevents escapes.

To prevent evil effects from incrustation, the water can be purified before being fed in, or different apparatus, applied inside the boiler, can be used for the purpose. Before feeding it in, water can thus be purified by chemical reactions; by heating it; or it can be distilled by using the condensed steam as feed-water. In the case of the presence in the water of carbonate of lime, held slightly in solution in the form of bicarbonate, the state of solution being aided by the presence of a slight excess of carbonic acid, by saturating, by means of a sufficient quantity of lime, the excess of carbonic acid, the greater portion of the neutral carbonate will be deposited on account of the very slight solubility of that salt.

The processes employed within the boiler consist in blowing out; mixing the water with substances modifying the incrustations either chemically or mechanically; employing the circulation of the water for extracting the matters in suspension, and applying electricity against the incrustations. Marine boilers are continually blown out. In France very good results in preventing solidification have been obtained by the use of logwood shavings. The steam, though the boiler does not prime, is of a violet color; no doubt from its taking up a little water.

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New Method of Producing Ice.

Franz Windhouser, of the Duchy of Brunswick, in Northern Germany, has, it is said, invented a new ice machine. The cooling process takes place in a cylinder, where the air is first powerfully condensed, then cooled by the admission of water, and finally expanded till its pressure is about equal to that of the atmosphere. This simple process, we are told, leads to astounding results, for it lowers the temperature of the air, so that after the latter has been conducted, in moderate quantities, into a space through which water flows, this water is almost immediately turned into ice, of which enormous blocks may be thus obtained if desired. The inventor is very sanguine about the utility of the machine for cooling large apartments, theaters, hospitals, and other localities where the want of pure, cool air is often much felt. No chemicals whatever are required, either for the freezing or cooling process. Of course this is all correct in theory, but practically we doubt that air can be thus used as a cooling agent with economy.

The Ocean Race.

The race between the *Dauntless* and the *Cambria* has terminated in the defeat of the former. The *Sapplo*, which started two days later, has at the present writing, July 29th, not yet arrived. The relative speed of the vessels has not been, and could not be decided by this race. The somewhat remarkable fact that the *Dauntless* arrived only an hour and forty minutes later than the *Cambria*, proves nothing, since the distances the vessels were separated on their different routes probably placed them under very different conditions of wind and weather. Beyond a transient pleasure enjoyed by talkers and betters upon the race, nothing has been gained. Per contra, two lives are lost, and the already too great sporting tendencies of American youths have received an additional stimulus.

Has the race paid? We think not.

Domestic Fowls and Destructive Insects.

It is said that M. Giot, a French entomologist, has lately found new employment for fowls. He says that French farmers have, during the past year, complained bitterly of the prevalence of worms, which infest corn and other crops, the highest cultivated fields being the most infested. Fowls are known to be the most indefatigable worm destroyers, pursuing their prey with extraordinary instinct and tenacity. But fowls cannot conveniently be kept upon every field, nor are they wanted there at all seasons. Therefore M. Giot has invented a perambulating fowl house, which is described as follows: "He has large omnibuses, fitted up with perches above, the nest beneath. The fowls are shut in at night, and the vehicle is drawn to the required spot, and, the doors being opened every morning, the fowls are let out to feed during the day in the fields. Knowing their habitation, they enter it at nightfall without hesitation, roost, and lay their eggs there."

Facts for the Ladies.

Mrs. A.V. Snow, of Port Kent, N.Y., has used a Wheeler & Wilson Sewing Machine eleven and a half years without a cent's worth of repairs. She is a seamstress and dressmaker, and made, the first year, one hundred shirts, besides doing all her family sewing for a family of eight persons. For two years past, the machine has earned over $250 a year on custom work, besides doing all Mrs. Snow's family sewing. She has yet some of the first dozen of needles sent with the machine.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Gloves.—D. S. Hulett, Gloversville, N.Y.—This invention relates to a new and useful improvement in re-inforcement of gloves for driving and other purposes.

Umber Compound.—A. H. Bourne, Fort Scott, Kansas.—This invention relates to a new compound of earths and minerals, for making umber, for use in painting.

Miter and Cut-off Box.—E. M. Wilcox, Bloomer, Wis.—This invention relates to a new and useful improvement in an apparatus for sawing miters and "cutting off," in the various processes incident to working in wood, whereby much labor is saved and accuracy is secured.

Churn.—M. J. Wikoff, Stout's Postoffice, Ohio.—This invention relates to an improved arrangement of the shaft and arms of a churn dasher for introducing air into the cream, either from the outside of the churn case, or rom the space in the case above the cream.

Wood Pavement.—Henry Dowson, Springfield, Ill.—This invention relates to a new and useful improvement in wood street pavements, whereby they are made more durable than such pavements have hitherto been, and it consists in so forming the lower portion of the blocks that double dovetail spaces are left between the blocks, in which spaces double dovetail strips or pieces are inserted.

Manufacture of Iron.—Henry Davies, Newport, Ky.—This invention relates to improvements in the manufacture of iron, according to what is known as the "Ellershausen Process," and consists in an arrangement of mixing table, molten iron ladle, and ore-feeding apparatus, whereby the mixture of ore or earthy matter with the molten metal can be made in exact and predetermined proportions.

Universal Coupling Joint.—Moses A. Keller, Littlestown, Pa.—This invention relates to improvements in universal coupling joints for shafts, and consists in a concave socket, in the end of one section, and a short cylindrical extension, and a ball on the other, fitting the socket, and secured to the socketed section by a pin or bolt fixed in the shell of the socketed section, and passing transversely through a bolt in the base, and traversing its axis perpendicular to a slot formed in the ball for the pin of the socketed section.

Grinders for Cleaning Castings.—Geo. Miller, Providence, R. I.—This invention relates to improvements in the grinding or rattling machines used for grinding and polishing castings, and consists in the arrangement of the cylinders, when mounted on friction rollers, with an opening in one end for loading and unloading them, so that the cylinders, which, being arranged, as they are, on the friction rollers, to have motion imparted to them, may be readily raised up and placed on end, may be filled or emptied while standing.

Cooking Stove.—Benj. F. Warren, Fishkill-on-the-Hudson, N. Y.—This invention relates to improvements in cooking stoves, and consists in the application thereto, under an elevated rear plate and over the oven, in a way not to take up any of the space of the stove available for other purposes, of a magazine for holding fuel, the bottom of which is hinged or pivoted at the back part, and shelving downward and resting at the front on a rear elevation of the grate, and extending the whole length of the same, whereby the fire may be continuously fed at the back from the magazine, and the latter may have a shaking motion imparted to it by the shaking of the grate.

Water Wheel.—Alfred Kneass, Northumberland, Pa.—This invention relates to improvements in that class of water wheels in which the application of the water is designed to be such as to impart both direct and reactionary force, and it consists in a peculiar arrangement of curved buckets, receiving the water at the periphery from a scroll in a direct-acting way, and discharging toward the center through issues common to two or more buckets, and above and below a central disk, by which the buckets and rim are attached to the vertical shaft.

Hinges.—S. D. Van Pelt, Anderson, Ind.—This invention relates to improvements in blind and door hinges, and consists in forming the leaves or parts which are attached to the doors or blinds, and frames in some cylindrical form, so that they may be fitted by boring round holes between the doors or blinds and the frames, half in each, when the doors or blinds are fitted and wedged up to the frames. The invention also consists in an arrangement of lugs and notches on the blind hinges, for locking them open or closed, and in a locking stud on the pintle to prevent the blind from being lifted off, except when a slot in the one part coincides with the locking stud on the pintle.

Sulky Cultivator.—N. G. Blauser, Etna, Ohio.—This invention has for its object to furnish an improved cultivator, light, strong, and durable of easy draft, fully under the control of the driver, and guarded from breakage should the shovel strike an obstruction.

Folding Counter Stool.—John L. Young. New York city.—This invention has for its object to furnish an improved folding counter stool, which shall be simple in construction, reliable and efficient in use, not liable to get out of order, and which, when not in use, may be folded up close to the counter, so as to be entirely out of the way.

Life-Preserving Skirt.—Sarah E. Saul, Brooklyn, N.Y.—This invention relates to a new and useful improvement in means for preventing persons from drowning, and consists in a skirt made buoyant by any suitable means so that it will support a person up in the water.

Adjustable Door Sill.—Maurice Armstrong. Girard, Ill.—The object of this invention is to provide efficient means for excluding mud and water from beneath outside doors, and consists in an adjustable sill for the door, which, by means of a hook attached to the door, is made to rise and form a close joint with the bottom of the door

Glass Lantern.—McClintock Young, Frederick, Md.—This invention relates to a new and useful improvement in lanterns, whereby they are made cheaper and more useful than the ordinary globe or glass lanterns have hitherto been, and it consists in the construction and arrangement of the frame of the lantern so that the ordinary kerosene glass lamp chimney may be used instead of the common glass globe.

Side Saddle.—Fenwick Smith, Austin, Texas.—This invention relates to a new and useful improvement in side saddles, and consists in forming the saddle tree hollow, or with air chambers therein, and in the construction and arrangement of parts.

Floating Tide Dock.—William Rickard, Jersey city, N. J.—This invention relates to a new and useful improvement in docks for repairing or building canal boats and other marine vessels, more designed for repairing canal boats, and it consists in a water-tight floating dock, with a gateway for the entrance of the boat or vessel.

Carpet Underlie.—Nelson Edwards, Jericho, Vt.—The object of this invention is to provide efficient means for preventing the rise of dust from carpets in sweeping or walking on them, and also for protecting the carpet and rendering it more durable than it would otherwise be; and it consists in an elastic underlie, of cellular construction, provided with self-closing slits or orifices.

Sawing Machine.—Moses N. Clark, Harrison city, Pa.—This invention has for its object to furnish a simple, convenient, and efficient machine to be operated by hand power, for sawing off logs and shingle stuff, and for various other purposes for which a crosscut saw is generally used.

Adding Machine.—Nels Ockerlund, New York city.—This invention has for its object to furnish a simple and convenient machine, by means of which numbers may be added and subtracted quickly and accurately, and which will enable the several amounts or differences to be registered as they are obtained.

Corn Planter.—W. H. Littel, Prairie Du Chien Wis.—This invention for its object to furnish a simple, convenient, and effective corn planter, which shall be so constructed and arranged as to enable the corn to be readily planted in accurate check row, without its being necessary to previously mark out the ground either way.

Flour Sifter.—George Gessert, Edwardsville, Ill.—This invention relates to a new machine for dividing and cleaning the middling, and liberating it from specks, so that a grade of flour may be produced from middling fully equal to the first grade. The invention consists in the construction of a machine, whereby the middling is reboited and exposed to an adjustable draft.

Electro-Magnet.—Ludovic Charles Adrien Joseph Guyot-d'Arlincourt, Paris, France.—This invention relates to a new system or arrangement of electro-magnets applicable to every electric apparatus, with the view of obtaining more rapid operation than could hitherto be produced, of reducing the necessity of regulation and of providing a reservoir with a single current.

Safety Guard for Railway Car.—John Atwater Wilkinson, Wilson, N. Y.—This invention relates to a new attachment to railroad cars, whereby the same may be prevented from being thrown from the track over the embankment, and whereby the motion of the train is gradually stopped as soon as the wheels leave the rails. The invention consists in the application to the car or truck of a double, runner-shaped guard, arranged between the wheels, so that it will serve to support the car, when the wheels leave the rails, and to arrest it by friction on the sleepers.

Fire and Deck Pumps.—P. M. and Oscar Snell, Williamsburgh, Ohio.—This invention consists in the combination of a lever having a movable fulcrum placed in vertical slots, with a slide valve with which said fulcrum is directly connected; the object of the arrangement being to give the slide valve the movement requisite to opening and closing the cylinder ports of a force pump. The invention was examined by the United States Board of Inspectors, which met in Washington last fall, and they adopted a resolution recommending it to the attention of manufacturers and others.

Harrow and Shovel Cultivator.—Albert B. Baum, Grantville, Pa.—This invention consists of bars mounted transversely of a frame so as to turn freely therein, except when prevented from rotating by means provided, each with two different sets of teeth projecting from opposite sides of the bars, one set being pyramidal, or such as are ordinarily used in harrows, and the other set being shovels such as are ordinarily used in cultivators, the object of this arrangement being to use either kind of teeth as may be expedient.

Machine for Packing Salt.—John McGrew, West Columbia, West Va.—This invention consists in a series of self-adjusting vertically sliding hammers which receive motion from a horizontal crank shaft; also in providing the hammers with wedge-shaped projections for packing salt into the bulges of the barrel; also in vertically adjustable tubes for conducting salt into the barrel; also in a rotating table for the barrel to stand on in order to insure a packing of uniform density.

Washing Machine.—Henry J. Moreland, Whitehall, Ill.—This invention consists of a suds box of oblong rectangular form provided at its ends with oppositely inclined slotted washboards, against which the clothes placed in the suds box are pressed by a reciprocating beater, said beater being fitted to slide upon guide ways and operated by means of a band lever.

Wagon Brake.—Henry Racine, Paola, Kansas.—This invention relates to a brake apparatus which is connected with the neck-yoke of the draft animals by a rod running forward under the tongue, and is operated by the rearward movement given to the said connecting rod by the holding back of the animals when going down hill, there being also in the combination a mechanism for preventing the application of the brakes when the animals are backing, by which mechanism also the brakes may be applied independently of the said connecting rod.

Adjustable Muley-Saw Head.—Philip and Michael C. Jobson, Lock Haven, Pa.—This invention has for its object to render a muley-saw head adjustable horizontally for the purpose of regulating the overhang of the saw according to the length of the feed.

Spirit Evaporating Chamber.—Joseph Dawson, Alexandria, Va.—The improvements relate to the evaporating chamber, which allows the liquid to present a larger evaporating surface in proportion to its quantity than has heretofore been attained; also to a device for preventing the wash from boiling over into the spirit chamber, and for returning the wash cooled to the evaporating chamber, when, through excess of heat, it has boiled up out of the same; also to a device which prevents the spirits from entering the cooling chamber and, at the same time, allows the wash to escape therefrom.

Chameleon Whirligig.—Ludwig O. Franke, Baltimore, Md.—This invention consists of two metallic disks placed together so that their peripheries coincide, and connected together by means of eyelets so as to form a whirligig which has its outer surfaces graduated and colored, so that as it is revolved it will constantly present to the eye new arrangements of colors which bear the appearance of rings.

Horse Power.—Robert Quinn, Whitefield, Miss.—This invention has for its object to furnish an improved horse power which shall be so constructed and arranged as to remove the necessity of building the houses for cotton gins, mills, and other machinery driven by horse power two stories high, while at the same time protecting the horse power machinery to be driven and material to be operated upon from the dust.

Folding Carriage Top.—T. H. Wood, New York City.—This invention relates to a new carriage top which is so constructed that its front part can be folded down over the driver's seat, while the front sashes are concealed in a pocket that is provided for their reception. The object of the invention is to so construct a closed carriage that it can be converted into an open phaeton without taking off or removing any part of the cover. It can then be reclosed whenever desired, while the carriage is under way.

Apparatus for Removing Oil from Oleaginous Seeds, Meals, etc.—E. S. Hutchinson, Baltimore, Md.—This invention relates to a novel apparatus for separating oil from seeds, grain, meal, etc., and in fact from all vegetable oleaginous matter, by means of bisulphide of carbon or other chemical. The invention consists chiefly in the arranging the separating vats in pairs, so that a continuous process can be carried on, the two vats of each pair serving to supply each other.

Furnace for Reburning Bone Black and Reducing Ores.—Adam Weber, New York City.—This invention relates to improvements in furnaces for reburning bone black and reducing ores, such as patented to the same inventor the 4th day of June, 1867, No. 65,470. The invention consists in certain improvements in the construction and arrangements described in the aforesaid patent.

Rein Holder.—W. H. Cooper, Glover, Vt.—This invention has for its object to furnish a simple and convenient device for holding the reins when the driver wishes to leave the team standing.

Wagon Hub.—J. D. Ham, Bethany, Ga.—This invention relates to a new wagon hub which is so constructed that it can be set to always hold the rim concentric to the axle, and so that the spokes can be removed and replaced without disturbing the rim.

Combined Toy Money Box and Whistle.—J. H. Chappell, Brooklyn, N. Y.—This invention has for its object to furnish a simple and substantial toy for children which will serve as a toy ball to roll about, as a toy money box or savings bank, as a toy whistle, and which, when it contains some money will serve as a rattle.

Mitering Machine.—John Holzberger, Newark, N. J.—This invention has for its object to construct a mitering machine which will be adjustable to always produce a true miter, and also to make up for the wear of its parts. The invention consists in making the guide or gage, on which the articles to be mitered are held, adjustable to vary its angle.

Chimney Top.—C. W. Bache, Philadelphia, Pa.—This invention has for its object to provide a chimney top which will at all times furnish a free exit to the smoke, from whatever direction the wind may come. The invention consists in providing the four sides of the smoke stack with doors, and in connecting the opposite doors with each other in such manner that when one is closed by the force of the wind the other will thereby be opened to permit the escape of the smoke on the side opposite to the wind.

Washing Machine.—Emanuel and Sabisea Cool, Buckhannan, West Va.—This invention relates to a new washing machine which is provided with a spring washboard and with a vertically adjustable corrugated roller, all operating in such manner as to produce the requisite rubbing and stamping action and perfect adjustment of parts to the treatment of coarser or finer articles.

Cultivator.—C. L. Waffle, Sharon Center, Ohio.—This invention has for its object to furnish an improved cultivator which shall be so constructed and arranged that it may be readily adjusted for simply stirring up, loosening, and pulverizing the soil, and for throwing the soil around the plants and which shall at the same time be simple in construction and easily operated, and effective in operation in either capacity.

Self-Oiler for Railroad Car Journal Boxes.—Charles Ihrig, Jersey City, N. J.—This invention has for its object to construct a self-oiling journal box for the axle bearings of railroad cars, and consists in the application to the box of a pump for conveying the lubricating material from the lower to the upper part of the journal box, the said pump being operated by the vertical movement of the car or truck body.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

R. D., of Mich.—We presume the process of making oxygen, mentioned in the article referred to by you, is the one claimed to have been discovered by MM. Clomadene and Moret, in France, for obtaining oxygen from sulphuric acid. Porous matter, such as pumice stone, is saturated with the sulphuric acid, and heated. The resulting sulphurous acid and oxygen are collected separately, and it is proposed to re-convert the sulphurous acid into sulphuric acid. We have serious doubts as to whether this process can ever prove successful, as an economical method of producing oxygen.

C. E. G., of Ct.—A small portable flue boiler as badly scaled as you describe yours to be, is probably spoiled. There are remedies innumerable prescribed, but we know of none that can be relied upon in all cases. Boiling with soda without pressure, as you propose, will hardly, we think, do the business. Boiling with slippery elm bark has sometimes the effect to loosen a scale, but it also often fails. Boiling with oak bark or twigs will also sometimes loosen a scale. Tannin is also used sometimes, with effect, but such a scale, in our experience rarely has yielded to anything of this kind.

J. R., of N. Y.—Rock-cork is an old name for a variety of asbestos.

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C. J., of Miss.—Unless the hose, which you propose to use as a siphon has enough rigidity to resist the atmospheric pressure, its walls will collapse. A metal pipe would be better. You might, however, prevent collapse in the hose by the use of coiled wire on the interior. There is no doubt that you can drain the land you speak of, by the use of a siphon, extended over the levee, the hight of which is only fifteen feet, and with one leg of the siphon six feet longer than the other. It is probably the best and cheapest plan you can use.

J. J. F., of Texas.—Your plan of filling the space between the outer and inner walls of safes with carbonic acid, instead of the ordinary filling, would not, as you suppose, prevent the application of the oxi-hydrogen blow pipe to the penetration of the outer or burglar-proof wall. The plan of putting materials into separate receptacles, connected by fusible plugs, so that when heated they should come in contact, and generate carbonic acid gas, for the protection of the contents of safes, is also, in our opinion, an impracticable scheme.

G .T. B., of Mass.—We regard the habitual use of any laxative as bad, unless the state of the system imperatively demands it. The latter point can only be determined by a skillful physician. The extensive use of aperient medicines, is, we think, entirely unnecessary. The result aimed at may, in most cases, be secured in a more rational way, namely proper attention to diet, exercise, and the general laws of health.

J. L. C., of Pa.—It is perfectly practicable to draw water to the hight of eighteen feet through a pipe one and one fourth inches in diameter, and seventy-five feet long, with a common small cast-iron pump. The tarnish of a silver watch is nothing extraordinary. The effect is due to sulphurous gases. The surface first turns a brownish yellow, which will, unless it be cleaned, deepen to a dirty black.

D. M., of Tenn.—Short-hand writing was known to the ancients. The short hand of the Romans was called "Tironian Notes," named it is supposed after Tiro, to whom the invention is credited. Manuscripts written in this hand date back as far as the seventh century. It is needless to say that it does not compare with the elegant and rapid modern systems of phonography.

C. L., of R. I.—"Oil of brick" is a name given by all chemists to empyreumatic oil, prepared by soaking bricks in oil, heating them to a high temperature, and condensing the vapors. It is used by lapidaries as a vehicle for the emery by which stones are sawn and cut.

T. H. S., of Ky.—The best way to coat small brass articles with tin is to boil them in a solution of cream tartar, containing scraps of block tin. If the articles are not finished after casting, they must be scaled with nitric acid, thoroughly washed, first in water, and next in water containing a potash, and afterward dried off in sawdust.

G. H., of Va.—Gas meters are tested at a fixed standard temperature, so that the volume they pass at each oscillation of the bellows is a constant. It is a mistake for a consumer to place a meter in a hot place, as the expansion of the gas will increase his bills.

D. E. P., of N. J.—Where fire insurance companies require the party walls of frame buildings to be bricked in, and two houses are placed together, the bricking in of one wall will not answer the requirement. Each wall must be bricked.

R. H. I., of Pa.—Your opponent is right. The word plank, in architecture, has a definite technical meaning. It is defined as a board exceeding nine inches in width. It is, however, commonly used by builders without regard to width.

E. G. S., of ——.—We do not believe a hair dye exists that is really efficacious in coloring the hair, that does not contain either lead or some other mineral poison.

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The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

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Our Windmill pumps water for railroads, country and city buildings, hotels, stock fields, drainage, and irrigation. Self-regulating, durable, and well tested. Con. Windmill Co., 5 College Place, New York.

The Entire Right of the best Wrench ever patented for sale. For drawings address J. F. Ronan, 36 Orchard st., Boston, Mass.

For the neatest, most durable, and cheapest curtain holder now in use; also, relative to prices, agencies, etc., address Yount & Keeports, Littlestown, Pa.

For Sale—The entire right of Parsons' Patent Tool Adjuster for Lathes. Drawings and description sent on application. Address C. H. Standish, New Haven, Conn.

Upright Forge Hammers, improved Drop Presses. Send for circular. Charles Merrill & Sons, 556 Grand st., New York.

Send 50c. for silver-plated sample (free by mail) of "The Safety Shutter Bow." It holds the shutters securely, at various bows, and in such a way that they cannot be opened from the outside. Agents wanted. J. Pusey, 2,210 Brandywine street, Philadelphia, Pa.

Cotton Compresses, Gove's Patent, for shipping and plantation use. Equal to hydraulics. Built to order by John H. Gove, Lynn, Mass.

Wanted Immediately—New or 2d-hand slotting machine, to slot not less than 16 inches. Address, with full description and price, Fulton Iron and Engine Works, Detroit, Mich.

Wanted—A partner, with Capital, to introduce a patent of general utility. Address box 139, Staunton, Va.

Send prices of Spoke Planer, Hub Mortising Machine, and Corn Mill to S. C. Talmadge, Monticello, Jasper Co., Ga.

Correspondence solicited with parties having drills suitable for tunneling, driven by power. H. C. Freeman, La Salle, Ill.

Manufacturers of self-regulating wind mills, please send circulars to J. S. McClellan, Urbana, Ohio.

Manufacturers of Carriages, Buggies, and Wagons, send descriptive price list to T. T. Edmunds, Columbus, Ga.

Catlin's Patent Self-closing Barrel Filler for filling packages with liquids of any kind. See other advertisement, and address, for circular, S. C. Catlin, Cleveland, Ohio.

Rawhide Sash Cord has no equal for heavy windows or dumb-waiters. Makes the very best round belting. Darrow M'f'g Co., Bristol, Ct.

Dickinson's Patent Shaped Carbon Points and adjustable holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24th, and Nov. 20, 1869. 64 Nassau st., New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Stationary Engine and Boiler, 2d-hand, in first-rate order, cylinder 16x24. For sale cheap. Address Howard Iron Works, Buffalo, N. Y.

Artificial Skin, absolutely water-proof. Applied immediately. Bruises, cuts, & burns. 50c. by mail. Try it. Ward & Co., Skaneateles, N. Y.

Japanese Paper Ware—Spitoons, wash basins, pails, milk pans, etc. Perfectly water-proof, and will not break or rust. Send for circulars. Jennings Brothers, 352 Pearl st., New York.

Pictures for the World.—Prang's latest publications: "Wild Flowers," "Water Lilies," "Chas. Dickens," for sale everywhere.

"Your $50 Foot Lathes are worth $75." Good news for all. At your door. Catalogues Free. N. H. Baldwin, Laconia, N. H.

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Patent Water-proof Building Paper for Carpet for halls and stairways, shoe stiffening, walls, ceilings, and roofs, manufactured by Mc Neil, Irving & Rich. Patentees, Elwood, Atlantic Co., N.J., or 59 Duane st., New York, 520 Commerce st., Philadelphia, Pa.

The Best Hand Shears and Punches for metal work, as well as the latest improved lathes, and other machinists' tools, from entirely new patterns, are manufactured by L. W. Pond, Worcester, Mass. Office, 98 Liberty st., New York.

Wm. Roberts & Co., Designers and Engravers on Wood, 36 Beekman st., New York, would respectfully announce that they are now prepared to receive orders from Manufacturers, and others, for engraving of machinery, views of stores, factories, trade marks, etc., etc.

Machinists and others using Fine Tools, send for illustrated catalogue. Goodnow & Wightman, 23 Cornhill, Boston.

Temped Steel Spiral Springs for machinists and manufacturers. John Chatillon, 91 and 93 Cliff st., New York.

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Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

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Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

It saves its Cost every sixty days—Mitchell's Combination Cooking Stove. Send for circular. R. B. Mitchell, Chicago, Ill.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING July 26, 1870.

Reported Officially for the Scientific American

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105,619.—PAPER FRUIT BASKET.—Alfred Adams, Chagrin Falls, and Joseph F. Jewett, Cincinnati, Ohio.

105,620.—CIGAR MACHINE.—Julian Allen and John Fanning, Brooklyn, N. Y., assignors to the American Cigar Machine Company, New York City.

105,621.—SEED PLANTER.—Prudden Alling, Norwalk, Ohio.

105,622.—APPARATUS FOR REDUCING WOOD TO PULP.—Gustavus Ames, New York City, assignor to himself and William H. Cilley, Northfield, N. H.

105,623.—ADJUSTABLE DOOR SILL.—Maurice Armstrong, Girard, Ill.

105,624.—CHIMNEY COWL.—Christian W. Bache, Philadelphia, Pa.

105,625.—TELEGRAPH INSULATOR.—William W. Baldwin, Cleveland, Ohio.

105,626.—STEAM GENERATOR.—Nelson H. Barbour, New York City. Antedated July 19, 1870.

105,627.—MACHINERY FOR CUTTING WAX INTO SHEETS.—W. F. Barnes (assignor to himself and Susan H. Clark), Rockford, Ill.

105,628.—NEEDLE THREADER.—Nelson Barnum, La Porte, Ind.

105,629.—PRUNING SHEARS.—H. W. Black, Cecilton, Md., assignor to himself and E. T. Evans, Middletown, Del.

105,630.—SULKY CULTIVATOR.—N. G. Blauser, Etna, Ohio.

105,631.—SEWING MACHINE.—Thomas Bletcher (assignor to himself and William Riddell), London, England. Antedated July 19 1870.

105,632.—POWER PRESS.—E. W. Bliss (assignor to Mays, Bliss & Co.), Brooklyn, N. Y.

105,633.—CUTTING ASHLARS.—William Boulton, Tompkinsville, Staten Island, N. Y.

105,634.—COMPOUND FOR MANUFACTURE OF PAINTS.—A. H. Bourne, Fort Scott, Kansas. Antedated June 9, 1870.

105,635.—RAILWAY CAR STARTER.—C. B. Broadwell, New Orleans, La.

105,636.—SPRING BED BOTTOM.—Mortimer Cahill, Kalamazoo, Mich. Antedated July 14, 1870.

105,637.—DESIGN DIE FOR ORNAMENTING.—B. F. Calley, Saugus, Mass.

105,638.—GAGE FOR PRINTING PRESSES.—Andrew Campbell, Brooklyn, N. Y.

105,639.—SHEEP SHEARS.—Daniel Campbell, Elizabeth, N. J., assignor to Henry Seymour & Co., New York city.

105,640.—STEAM HEATER.—B. F. Campbell and Charles Whittier, Boston, Mass.

105,641.—RECEPTACLE FOR MEASURING OUT SHOT.—E. C. Carleton (assignor to William Stewart & Co.), Port Huron, Mich.

105,642.—STEAM GENERATOR.—John Carroll, Detroit, Mich.

105,643.—HULLING MACHINE.—J. E. Carver (assignor to H. T. Pratt and J. C. Alden), Bridgewater, Mass.

105,644.—LAMP.—David Challinor, Birmingham, Pa.

105,645.—TOY MONEY BOX.—J. H. Chappell, Brooklyn, N. Y.

105,646.—WASHING MACHINE.—W. B. Cheeseman, Winona, Minn.

105,647.—SAWING MACHINE.—M. N. Clark, Harrison City, Pa.

105,648.—WATER PROOF CEMENT.—T. S. Clark, Charlestown, Mass.

105,649.—SAD IRON.—John Conner, Richmond, Ind. Antedated July 15, 1870.

105,650.—WASHING MACHINE.—Emanuel Cool and Sabisea Cool, Buckhannan, West Va.

105,651.—REIN HOLDER.—W. H. Cooper, Glover, Vt.

105,652.—CHURN.—W. H. Curtin, Clement, and William Lammers, Breese, Ill.

105,653.—RELAY MAGNET.—L. C. A. J. G. D'Arlincourt, Paris, France.

105,654.—ADJUSTABLE REEL POST FOR HARVESTERS.—J. W. Davis, Dublin, Ohio.

105,655.—EGG BEATER.—G. K. Dearborn, Pawtucket, assignor to Timothy Earle, Smithfield, R. I.

105,656.—CRAMP HOOK FOR TELEGRAPHIC WIRE INSULATORS.—W. H. DeChant (assignor to David Brooks), Philadelphia, Pa.

105,657.—PLANING AND MOLDING MACHINE.—Frank Douglas, Norwich, Conn.

105,658.—WOOD PAVEMENT.—Henry Dowson, Springfield, Ill.

105,659.—MACHING FOR CRUSHING MINERAL AND OTHER HARD SUBSTANCES.—D. C. Ebaugh, Charleston, S. C.

105,660.—DEVICE FOR PREVENTING PLOWS FROM CHOKING.—W. M. Eccles, St. Louis, Mo.

105,661.—CARPET "UNDERLIE".—Nelson Edwards, Jericho, Vt.

105,662.—FARM GATE.—G. J. Fiedler, Danby, Ill.

105,663.—ELECTRO-MAGNETIC MOTOR.—Louis Finger, Cambridge, Mass.

105,664.—ELECTRO-MAGNETIC APPARATUS FOR MOVING PANORAMAS.—Louis Finger, Cambridge, Mass.

105,665.—MOVABLE SCREEN FOR PHOTOGAPHERS.—E. J Foss, Cambridge, Mass. Antedated January 26, 1870.

105,666.—DEPURATOR.—S. C. Frink, Indianapolis, Ind.

105,667.—FLOUR SIFTER.—George Gessert, Edwardsville, Ill.

105,668.—MACHINE FOR ROLLING PLOW BEAMS.—William Gilman, Ottawa, Ill.

105,669.—VAPOR BURNER.—L. A. Gouch, Yonkers, N. Y.

105,670.—MANUFACTURE OF SOAP.—Louis Groux, New York city.

105,671.—BOOT JACK AND SPUR.—Timothy Gunn, Hamilton county Ind.

105,672.—COAL STOVE.—Joseph Hackett, Louisville, Ky.

105,673.—PLOW.—J. D. Hall (assignor to William Kingsworth), Canton, Ohio.

105,674.—WAGON HUB.—J. D. Ham (assignor to himself, Eli McCroan, and W. A. Wilkins), Bethany, Ga.

105,675.—BOLT.—Mathew Harbster (assignor to Harbster Brothers & Co.) Reading, Pa.

105,676.—SCHOOL SEAT.—C. G. Harrington and David Mills, Northville, Mich.

105,677.—CHAIR AND LOUNGE.—M. P. Harley, Philadelphia, Pa.

105,678.—OVEN OR STOVE FOR HEATING THE BLAST OF BLAST FURNACES.—J. M. Hartman, Philadelphia, Pa. assignor to George W Whitaker.

105,679.—MODE OF ATTACHING HOLD BACK RINGS TO HAMES.—W. B. Hayden, Columbus, Ohio.

105,680.—HORSE POWER.—J. R. Hedges, Glenwood, assignor to himself and Valentine & Sparks, Buffalo, N. Y.

105,681.—CIGAR BOX.—Eugen Henkel, North Scituate, R. I.

105,682.—WINDLASS.—Alonzo Hitchcock, New York city.

105,683.—OIL STILL.—John Hofferberth, Baltimore, Md.

105,684.—DUMPING WAGON.—Britain Holmes, Buffalo, N. Y.

105,685.—STEAM GAGE.—J. P. Holt, Cleveland, Ohio.

105,686.—MITERING MACHINE.—John Holzberger, Newark, N. J.

105,687.—GLOVE.—D. S. Hulett, Gloversville, N. Y.

105,688.—APPARATUS FOR REMOVING OIL FROM SEEDS, MEAL, ETC.—E. S. Hutchinson, Baltimore, Md.

105,689.—RAILROAD CAR JOURNAL BOX.—Charles Ihrig, Jersey City, N. J.

105,690.—GRAIN DRILLING MACHINE.—Joseph Ingels, Milton, Ind.

105,691.—PADLOCK.—Joseph Ingels, Milton, Ind.

105,692.—LAMBREQUIN.—H. M. Johnston, New York city. Antedated July 11, 1870.

105,693.—LAMBREQUIN.—H. M. Johnston, New York city Antedated July 11, 1870.

105,694.—WATER WHEEL.—G. H. Jones, Rose, N. Y.

105,695.—BOXING FOR COVERING THE SHAFTING OF MACHINERY.—M. R. Jones, Darien, Wis.

105,696.—UNIVERSAL SHAFT COUPLING.—M. A. Keller, Littlestown, Pa.

105,697.—COMPOUND SWITCH FOR ELECTRIC BATTERIES.—Jerome Kidder, New York city.

105,698.—WATER WHEEL.—Alfred Kneass, Northumberland, Pa.

105,699.—METALLIC RAILWAY CAR.—B. J. La Mothe, New York city.

105,700.—TRACE-SUPPORTING STUD.—Josiah Letchworth, Buffalo, N. Y.

105,701.—COMBINED HOBBY HORSE AND CARRIAGE MOTOR.—John Liming, Philadelphia, Pa.

105,702.—CORN PLANTER.—W. H. Little, Prairie Du Chien, Wis.

105,703.—CORN AND SEED PLANTER.—Wilber C. Lockwood, Spring Mills, Mich.

105,704.—CROSS-CUT SAW.—Peter Longwell, Poplar, Ohio.

105,705.—DEVICE FOR PREVENTING THE UNCOUPLING OF CLUTCHES IN SPINNING MULES.—Hezekiah Macon and Joshua Hunt Providence, R. I.

105,706.—CAR COUPLING.—Malancthon B. Malott, Richmond, Ind.

105,707.—WOOD PAVEMENT.—Duncan McKenzie, Brooklyn, N. Y.

105,708.—ROTARY ENGINE.—Edwin D. Mead, Shortsville, N. Y.

105,709.—GRAIN DRYER.—Robert Milburn and Thomas Browning, No. 76 Church Lane, Whitechapel, Great Britain.

105,710.—PADLOCK.—D. K. Miller, Reading, Pa. Antedated July 22, 1870.

105,711.—GRINDER FOR CLEANING CASTINGS.—George Miller, Providence, R. I.

105,712.—WATER WHEEL.—George Miller, Providence, R. I.

105,713.—TAP-NOZZLE FOR CANS.—Herman Miller, New York city.

105,714.—METALLIC STANDARD FOR WAGON BOXES.—Edward Milner, Marquette, Mich.

105,715.—ATTACHMENT FOR SEWING MACHINE.—Schamu M. Moschcowitz, New York city.

105,716.—CORN HARVESTER.—Nelson Newman, Springfield, Ill.

105,717.—ADDING MACHINE.—Nels Ockerlund, New York city.

105,718.—REED MUSICAL INSTRUMENT.—Isaac T. Packard, Chicago, Ill.

105,719.—PLANKING SET.—E. H. Parker, Bucksport, Me. Antedated July 18, 1870.

105,720.—TREATING AND PRESERVING GRAIN IN BULK.—Charles F. Parrott (assignor to himself and John F. Kohler), New York city.

105,721.—TABLET LOCKET FOR PHOTOGRAPHS, ETC.—G. W Pitcher, Brooklyn, N. Y.

105,922.—HORSE HAY FORK.—H. G. Porter, Grand Rapids, Mich.

105,723.—HAY CARRIER.—T. J. Powell, Naples, N. Y., assignor to George Smith, Providence, R. I., and J. C. DeLang, Detroit, Mich.

105,724.—HORSE POWER.—Robert Quinn, Whitefield, Miss.

105,725.—FLOATING TIDE DOCK.—William Rickard (assignor to himself and E. K. Meigs), Jersey City, N. J.

105,726.—MUSIC-LEAF TURNER.—E. B. Robinson, Portland Me

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105,727.—MATCH STICK.—John K. Robinson, Middlebury, Ohio.

105,728.—ENGINE FOR SEPARATING FIBER FROM HUSKS OF COTTON SEED.—Thomas Rose and Robert Emerson Gibson, Earlstown, England.

105,729.—PROCESS FOR SEPARATING THE FIBER FROM THE HUSK IN COTTON-COATED SEEDS.—Thomas Rose and R. E. Gibson, Earlstown, England.

105,730.—LIFE-PRESERVING SKIRT.—Sarah E. Saul, Brooklyn, N. Y. Antedated July 14, 1870.

105,731.—TABLE CASTER.—Daniel Sherwood, E. P. Woods, and George D. Dudley (assignors to Woods, Sherwood & Co.), Lowell, Mass.

105,732.—TABLE CASTER.—Daniel Sherwood and George D. Dudley (assignors to Woods, Sherwood & Co.), Lowell, Mass.

105,733.—HORSE HAY RAKE.—A. J. Shunk, Des Moines, Iowa.

105,734.—SIDE SADDLE.—Fenwick Smith, Austin, Texas.

105,735.—AUTOMATIC GATE.—Pratt A. Spicer and Montgomery Crossman, Marshall, Mich.

105,736.—RIFLED CANNON.—A. C. Stimers, Castleton, N. Y. Antedated July 22, 1870.

105,737.—HEATING STOVE.—Carl L. Svensson (assignor to J. Q. C. Searle), Topeka, Kansas. Antedated July 21, 1870.

105,738.—HEATING FURNACE.—William A. Sweet, Syracuse, N. Y.

105,739.—VELOCIPEDE.—Ephraim Tarbox, Charlestown, Mass.

105,740.—FARMERS' BOILER.—L. W. Thickins, Batavia, Ill., assignor to David R. Sperry.

105,741.—SEWING MACHINE.—Cyrus B. True, Boston, Mass.

105,742.—DISH-WASHING MACHINE.—Sophia S. Tupper, Churchville, N. Y.

105,743.—HINGE.—S. D. Van Pelt, Anderson, Ind.

105,744.—HOLLOW AUGUR.—Isaac H. Van Wie, Clarksville, N. Y.

105,745.—CULTIVATOR.—Charles L. Waffle, Sharon Center, Ohio.

105,746.—COOKING STOVE.—Benjamin F. Warren, Fishkill, N. Y.

105,747.—FURNACE FOR REBURNING BONE BLACK AND REDUCING ORES.—Adam Weber, New York city.

105,748.—STOVE LEG.—Frank Whalen, Ballston Spa, N. Y.

105,749.—LAND ROLLER.—Elisha Whitcomb and D. A Gunn, Waterville, Ohio.

105,750.—LUBRICATOR.—John B. Wickersham, Philadelphia, Pa. Antedated July 11, 1870.

105,751.—CHURN.—Milton Jones Wikoff, Stout's Postoffice, Ohio.

105,752.—MITER BOX.—E. M. Wilcox, Bloomer, Wis.

105,753.—SAFETY-GUARD FOR RAILWAY CARS.—J. A. Wilkinson, Wilson, N. Y.

105,754.—RAILWAY CROSSING.—R. P. Williams, Great George Street, Westminster, England. Patented in England, Feb. 24, 1869.

105,755.—METALLIC PLATE SCREEN FOR SCREENING PAPER PULP.—A. St. C. Winchester (assignor to himself and J. S. Parsons), Boston, Mass.

105,756.—GAS APPARATUS FOR RAILROAD CARS, ETC.—J. S. Wood (assignor to himself and John J. Carberry), Philadelphia, Pa.

105,757.—GAS APPARATUS FOR RAILROAD CARS, ETC.—Joseph S. Wood (assignor to himself and John J. Carberry), Philadelphia, Pa.

105,758.—FOLDING BUGGY-SEAL.—Thomas H. Wood, New York city.

105,759.—PREPARING RAWHIDE FOR USE IN CHAIR SEATS.—B. F. Wright, Charlestown, and John Rowe, Jr., Wilmington, Mass., assignors of three-fifths of their right to S. H. Woodbury, W. T. Gray, and C. H. Drew.

105,760.—BORING AND MORTISING MACHINE.—S. M. Wright, Athens, Ohio.

105,761.—FOLDING COUNTER STOOL.—John L. Young, New York city.

105,762.—LANTERN.—McClintock Young, Frederick, Md.

105,763.—REFRIGERATOR.—Ignazio Allegretti, Philadelphia, Pa.

105,764.—VENT FOR CASKS.—William Ascough, Buffalo, N. Y.

105,765.—TRAVELING BELT STOP FOR MACHINERY.—Thomas E. Baden, Washington, D. C.

105,766.—BOX SCRAPER.—J. R. Bailey (assignor to himself and S. A. Bailey), Woonsocket, R. I.

105,767.—BENCH PLANE.—J. R. Bailey (assignor to himself and S. A. Bailey), Woonsocket, R. I.

105,768.—GAS BURNER.—J. F. Barker, Springfield, Mass.

105,769.—APPARATUS FOR IMMERSING SHINGLES AND OTHER ARTICLES IN LIQUIDS.—Caleb Bates, Kingston, Mass.

105,770.—COMBINED HARROW AND SHOVEL CULTIVATOR.—A. B. Baum, Grantville, Pa.

105,771.—BEDSTEAD FASTENING.—John Benjamin, Naples, N. Y.

105,772.—AUTOMATIC FAN.—George H. Briggs, Montgomery, Ala.

105,773.—PLATFORM FOR STOVES.—Clark Brownell, Troy, N. Y.

105,774.—MACHINE FOR FLOCKING WALL PAPER, SHOW CARDS ETC.—H. W. Bulkley, New York city.

105,775.—HARROW.—W. J. Burdick, Alfred, N. Y., assignor to himself and J. E. Morehesse.

105,776.—LIQUOR PUMP.—Martin Cavanaugh, Philadelphia, Pa.

105,777.—SCISSORS SHARPENING ATTACHMENT FOR SEWING MACHINES.—G. T. Chattaway, Brooklyn, N. Y.

105,778.—SPOOL OF THREAD FOR SEWING-MACHINE SHUTTLES.—D. M. Church (assignor to himself and Timothy Merrick), Holyoke, Mass.

105,779.—CULINARY VESSEL.—Emma Clark, Buffalo, N. Y.

105,780.—ORGAN, MELODEON, ETC.—H. A. Clarke, Philadelphia, Pa.

105,781.—LAWN MOWER.—Thos. Coldwell and G. L. Chadborn, Newburg, N. Y.

105,782.—WATER CLOSET.—J. M. Davis (assignor to himself and J. C. Grannon), Cincinnati, Ohio.

105,783.—ALCOHOL AND SPIRIT STILL.—Joseph Dawson, Alexandria, Va.

105,784.—CORN-HARVESTER CUTTER.—J. J. De Freitas, Springfield, Ill.

105,785.—CATAMENIAL SACK.—W. A. Dinsmore (assignor to himself and Emily L. Geer), South Boston, Mass.

105,786.—FURNACE FOR SALT BOILING.—W. J. Dodge, Syracuse, N. Y.

105,787.—SASH LOCK.—G. W. Dubuison, Norwich, Conn.

105,788.—RECTIFYING WHISKY, ETC.—Henry Fake, Brooklyn, assignor to himself and C. A. Todd, New York city.

105,789.—SEAT-FASTENING FOR CARRIAGES.—J. H. Fellows, Alba, Pa.

105,790.—MANUFACTURE OF STRAW & OTHER PAPER BOARD.—B. F. Field, Beloit, Wis.

105,791.—RAILWAY CAR COUPLING.—J. C. Fisher and W. E. Kittridge, Milwaukee, Wis.

105,792.—CHAMELEON WHIRLIGIG.—Ludwig Ottmar Franke, Baltimore, Md.

105,793.—CARRIAGE AXLE.—Matthew Ross Freeman, Macon, Ga.

105,794.—DISH FASTENER.—Christian R. Freet, Upper Strasburg, Pa.

105,795.—ARGAND GAS BURNER.—Jim B. Fuller, Norwich, Conn.

105,796.—ROTARY ENGINE.—William M. Fuller, New York city.

105,797.—BOTTLE STOPPER.—William H. Gibbs, Cincinnati, Ohio.

105,798.—BEDSTEAD FASTENING.—Alexander Grillet, Philadelphia, Pa.

105,799.—GUN LOCK.—Lewis Hailer (assignor to W.C. Dodge), Washington, D. C.

105,800.—LOCK SPINDLE.—J. L. Hall, Cincinnati, Ohio.

105,801.—CARRIAGE AXLE.—William N. Hall, Springfield, Texas.

105,802.—MACHINE FOR SHARPENING REAPER KNIVES.—C. C. Hardy, Rutland, N. Y.

105,803.—EARTH CLOSET.—George Baker Jewett, Salem, Mass.

105,804.—SAW MILL.—Philip Jobson and M. C. Jobson, Lockhaven, Pa.

105,805.—MACHINE FOR BENDING CORRUGATED METAL PLATES.—Asa Johnson, Brooklyn, N. Y.

105,806.—FIREPLACE.—A. B. Johnson, Washington, Ind.

105,807.—HOPPER FOR MILLS AND GRAIN DRILLS.—R. P. Johnson, Griffin, Ga.

105,808.—CASE FOR TURBINE WATER WHEELS.—J. O. Joyce, Dayton, Ohio.

105,809.—COMPOSITION FOR "ENCAUSTIC" PAINTING.—W. H. F. Kehrwieder, Philadelphia, Pa.

105,810.—DRILL FOR SEED PLANTERS.—J. F. Keller (assignor to himself and Wm. Updegraff), Hagerstown, Md.

105,811.—FERTILIZER ATTACHMENT TO SEEDING MACHINES. John F. Keller (assignor to himself and William Updegraff), Hagerstown, Md.

105,812.—SELF-ACTING MULE FOR SPINNING.—P. J. Kent and N. W. Bancroft, Worcester, assignors to themselves, J. R. Kent, and J. G. Avery, Spencer, Mass.

105,813.—VALVE FOR STEAM AND OTHER PUMPS.—Lucius J. Knowles, Worcester, Mass.

105,814.—STALL FOR PREVENTING CRIBBING.—John Kraus (assignor to himself and Henry Lapp), Clarence, N. Y.

105,815.—SPINNING MACHINE.—W. La Banister and L. V. Doggett, Pacific, Wis.

105,816.—HEATING STOVE.—Silas Hoffman La Rue, Allentown, Pa.

105,817.—PIPE COUPLING.—William A. Lighthall, New York city.

105,818.—FAUCET.—J. H. Lord, San Francisco, Cal.

105,819.—VAPOR OR GAS BURNER.—John C. Love, Philadelphia, Pa.

105,820.—SHUTTLE FOR SEWING MACHINES.—Lucius Lyon, New York city.

105,821.—HORSE COLLAR.—C. K. Marshall, New Orleans, La., assignor to the Climax Horse Collar Co., New York city.

105,822.—COMBINED HAIR CURLER AND CRIMPER.—Elisha Matteson (he having assigned two thirds of his right to Abraham Hoagland), Jersey City, N. J.

105,823.—PROCESS OF COATING OBJECTS WITH COLLODION AND ITS COMPOUNDS.—John A. McClelland, Louisville, Ky. Antedated July 22, 1870.

105,824.—TURNING DEVICE.—Wm. H. McMillan and David Morris (assignors to Morris, Tasker & Co.), Philadelphia, Pa.

105,825.—HAND CORN SHELLER.—W. A. Middleton, Harrisburgh, Pa.

105,826.—WEATHER BOARD SCRIBE.—Abraham Miller and Uriah Faris, Red Rock township, Iowa.

105,827.—WRENCH.—C. H. Miller (assignor to himself and M. Doll), Buffalo, N. Y.

105,828.—CULTIVATOR.—Isaac Miller, Worth, Mich.

105,829.—AWNING FOR CARS, ETC.—J. H. Monce, New York city

105,830.—THAWING DEVICE FOR HYDRANTS AND FIRE PLUGS.—J. C. Moore, Philadelphia, Pa. Antedated July 16, 1870.

105,831.—WASHING MACHINE.—H. J. Moreland, Whitehall, Ill.

105,832.—WAGON-SEAT FASTENING.—Fred Norris, Freedom Plains, N. Y.

105,833.—HORSE HAY RAKE.—Sherman R. Nye, Barre, Mass.

105,834.—TELEGRAPH INSULATOR.—Samuel Oakman, Boston, Mass.

105,835.—SHOW CASE FOR RIBBONS, ETC.—Geo. W. Pagett, Oxford, Ind.

105,836.—MANUFACTURE OF HOLLOW FELTED ARTICLES.—C. W. Palmer and H. E. Palmer, Lynn, and Charles Houghton Boston, Mass., assignors to Charles Houghton.

105,837.—HAY LOADER.—Isaac J. Parker, Buffalo Grove, Iowa.

105,838.—SPADE AND SHOVEL.—John W. Pearce, Suisun, Cal.

105,839.—CYLINDER FOR MIXING FERTILIZERS.—Leman B. Pitcher, Salina, N. Y.

105,840.—MORTAR MILL.—Leman B. Pitcher, Salina, N. Y.

105,841.—STEAM ENGINE GOVERNOR.—Wm. H. Place, New York city.

105,842.—WASHING MACHINE.—Daniel B. Pond, Woonsocket, R. I.

105,843.—PLOW.—Samuel W. Pope, Louisville, Ky.

105,844.—SUBSOIL PLOW.—Elam M. Query, Harris Depot, N. C.

105,845.—BRAKE FOR WAGONS.—Henry Racine, Paola Kansas.

105,846.—MACHINE FOR PRESSING SEAMS AND CUTTING WELTS FOR BOOTS AND SHOES.—Edwin Reed, Kingston, Mass.

105,847.—STEAM GOVERNOR.—A. F. Reeder, Normal, Ill.

105,848.—SAWING MACHINE.—Augustus Renetzky, Lincoln, Ill.

105,849.—SULKY ATTACHMENT TO PLOWS.—J. H. Reynerson and John Worrel, Clayton, Ind.

105,850.—CABINET BEDSTEAD.—Andrew J. Roberts, Boston, Mass.

105,851.—CURING AND PRESERVING MEAT, ETC.—Adolphe Rock, New Orleans, La.

105,852.—TUCK-CREASING ATTACHMENT FOR SEWING MACHINES.—J. B. Safford, San Francisco, Cal.

105,853.—SPRING BED BOTTOM.—M. Van Buren Shepard, Chicago, Ill.

105,854.—SPRING CURTAIN FIXTURE.—John Shorey, Lowell, Mass. Antedated July 15, 1870.

105,855.—TYPE SETTING MACHINE.—John T. Slingerland, New York city.

105,856.—PANTALOONS.—T. E. Sloan, Brooklyn, N. Y.

105,857.—SAFETY MEASURING FUNNEL.—F. H. Smith, Burke, Vt.

105,858.—MACHINE FOR DITCHING AND HEDGING.—William Stacy, Hardin county, Iowa.

105,859.—CIGAR MACHINE.—G. W. Tanner and F. D. Bliss, Providence, R. I.

105,860.—CHUCK.—S. P. M. Tasker, Philadelphia, Pa.

105,861.—DIE STOCK.—Stephen P. M. Tasker, Philadelphia, Pa.

105,862.—MECHANISM FOR RETAINING, ADJUSTING, AND SEWING PARASOLS.—W. J. Tate (assignor to Wm. A. Drown & Co.), Philadelphia, Pa.

105,863.—RAILROAD RAIL SPLICE.—G. O. Taylor, Hamilton, Va.

105,864.—HOT AIR FURNACE.—George G. Thomas, St Louis, Mo.

105,865.—CORN MARKER.—Jesse B. Thomas, Centreville, Ind.

105,866.—GRAIN DRILL.—John H. Thomas, Springfield, Ohio.

105,867.—LAMP.—G. W. Thompson, Buffalo, N. Y.

105,868.—CLAMP FOR BRIDGES.—Lucius E. Truesdell, Chicago, Ill.

105,869.—CARPENTERS' PLANE.—C. E. Tucker (assignor to himself and T. L. Appleton), Boston, Mass.

105,870.—MACHINE FOR MOTIVE POWER.—Horace Wickham, Jr., Chicago, Ill.

105,871.—CURTAIN FIXTURE.—John H. Wilhelm, Chicago, Ill.

105,872.—CORN SHELLER.—John B. Wolford, Lancaster, Ohio.

105,873.—MACHINE FOR NICKING SCREW BLANKS.—Aurin Wood, Worcester, Mass.

105,874.—PERCUSSION CAP.—B. F. Woodside, McDonald Station, Tenn. Antedated July 15, 1870.

105,875.—CANDLESTICK.—Henry Zahn, San Francisco, Cal.

105,876.—CARRIAGE STEP.—W. W. Knowles, Plantsville, Conn.

REISSUES.

4,078.—MECHANICAL MOVEMENT.—H. J. Case, Nelson Chapin, and Charles Richardson, Auburn, N. Y., assignees of H. J. Case.—Patent No. 89,026, dated April 20, 1869.

4,079.—PAPER-FOLDING MACHINE.—C. Chambers, Jr., Philadelphia, Pa.—Patent No. 15,842, dated Oct. 7, 1856.

4,080.—MEDICAL VACUUM APPARATUS.—J. G. Hadfield, Cincinnati, Ohio.—Patent No. 72,631, dated Dec. 24, 1867.

4,081.—SHANK SPRING.—Edward Heaton, New Haven, Conn.—Patent No. 75,266, dated March 10, 1868.

4,082.—Division A.—STEAM GENERATOR.—John B. Root, for himself and T. C. M. Paton, assignee of J. B. Root, New York city.—Patent No. 74,146, dated Feb. 4, 1868.

4,083.—Division B.—STEAM GENERATOR.—John B. Root, for himself and T. C. M. Paton, assignee of J. B. Root, New York city.—Patent No. 74,146, dated Feb. 4, 1868.

DESIGNS.

4,257.—TRADE MARK.—John Adams, Birmingham, Pa.

4,258.—CARPET PATTERN.—James Allinson (assignor to Jas. Bromley & Bros.), Philadelphia, Pa.

4,259.—LAMP.—J. S. Atterbury and T. B. Atterbury, Pittsburgh, Pa.

4,260.—JELLY GLASS.—Wm. Doyle, Birmingham, Pa.

4,261.—GLASS WARE.—W. M. Kirchner, Pittsburgh, Pa., assignor to the National Glass Co., Bell Aire, Ohio.

4,262.—CORN HUSKER.—A. T. Morris, Nevada, Ohio.

4,263.—GLASS WARE.—John Oesterling, Wheeling, West Va.

4,264.—TIP OF A SWORD SCABBARD.—Virgil Price, New York city.

4,265.—SWORD GUARD.—Virgil Price, New York city.

4,266.—TRADE MARK.—H. C. Rogers, Village of Sauquoit, Paris, N. Y.

4,267.—TYPE.—Richard Smith, Philadelphia, Pa., assig no to MacKellar, Smiths & Jordan.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,657.—PRINTING TELEGRAPH APPARATUS.—E. W. Andrews, Englewood, N. J., and G. B. Field, New York city. June 8, 1870.

1,661.—WOVEN AND KNITTED FABRICS AND YARNS.—Louis Robbins, New York city, and John Southmayd, Elizabeth, N. J. June 8, 1870.

1,675.—STEAM BOILERS.—J. B. Root, New York city. June 9, 1870.

1,680.—MACHINERY FOR RAISING SUNKEN SHIPS, ETC.—J. T. Parlour, New York city. June 10, 1870.

1,687.—EMBROIDERING ATTACHMENT FOR SEWING MACHINES.—N. Wheeler New York city. June 11, 1870.

1,708.—FORMING BATS OF WOOL FOR FELTING PURPOSES.—John Falconer, New York city. June 14, 1870.

1,716.—FERTILIZER.—D. A. Ter Hoeven, Philadelphia, Pa. June 15, 1870.

1,709.—APPARATUS FOR FORMING HEELS FOR BOOTS AND SHOES, ETC.—H. H. Bigelow, Worcester, Mass. June 15, 1870.

1,733.—GAS BURNERS.—F. C. Krause, New York city. June 17, 1870.

1,766.—SOAP MAKING.—M. Hyde and Francis Hyde, Baltimore, Md. June 21, 1870.

1,724.—STEEL WASHERS.—W. Butcher, Philadelphia, Pa., and G. W. Billings, Chicago, Ill. June 16, 1870.

1,726.—PAINT BRUSHES.—J. J. Lowerre, Brooklyn, N. Y. June 16, 1870.

1,764.—RIGGING FASTENINGS.—W. C. Ireland, Boston, Mass. June 21, 1870.

1,784.—APPARATUS FOR MAKING BESSEMER STEEL.—A. L. Holley, Brooklyn, N. Y. June 22, 1870.

1,801.—DISTILLING ALCOHOLIC LIQUORS.—S. F. Van Choate, Boston, Mssa June 24, 1870.

GREAT VALUE OF PATENTS.

PROBABLY no investment of a small sum of money brings a greater return than the expense incurred in obtaining a patent, even when the invention is but a small one. Larger inventions are found to pay correspondingly well. The names of Blanchard, Morse, Bigelow, Colt, Ericsson, Howe, McCormick, Hoe, and others, who have amassed immense fortunes from their inventions, are well known. And there are hundreds of others who have realized large sums—from fifty to one hundred thousand dollars—and a multitude who have made smaller sums, ranging from twenty-five thousand to fifty thousand dollars, from their patents. The first thing requisite for an inventor to know is, if his invention is patentable. The best way to obtain this information, is either to prepare a sketch and description of the invention, or construct a model, and send to a reliable and experienced patent solicitor, and ask advice.

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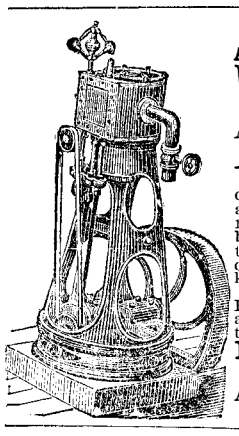

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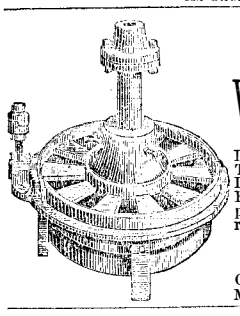

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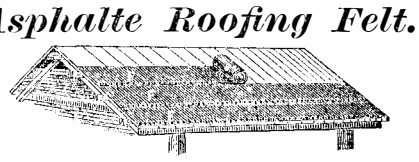

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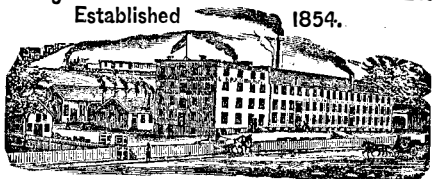

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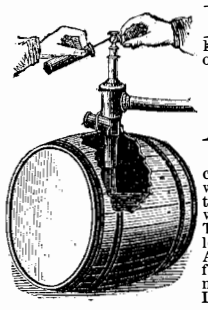

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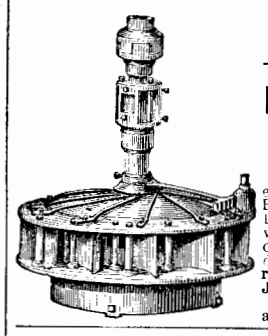

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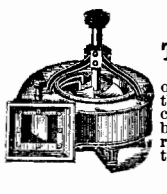

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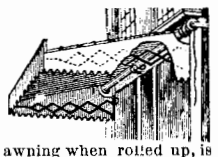

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